

Founded in 1832

RAILWAY

LOCOMOTIVES AND CARS

JUNE 1956

One of Five Specialized Railway Age Publications

formerly

RAILWAY
Mechanical and
Electrical Engineer

NYC Gets
First Train X

SAL Box Car
Gets 20-Ft Doors

NYC Mixes
Its Own

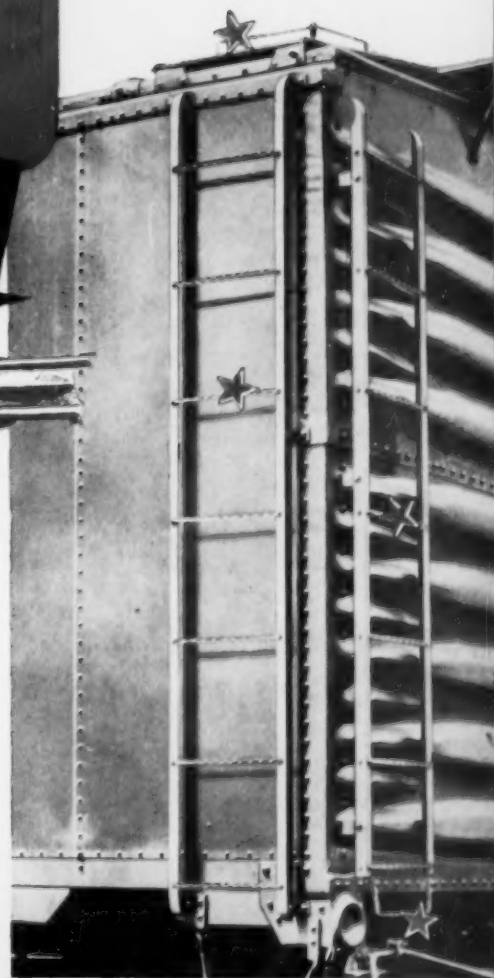
How SP Cuts
Sanding and
Slipping

GREATER *All-weather*
SAFETY
for the trainman...

WITH
THIS
GRIP

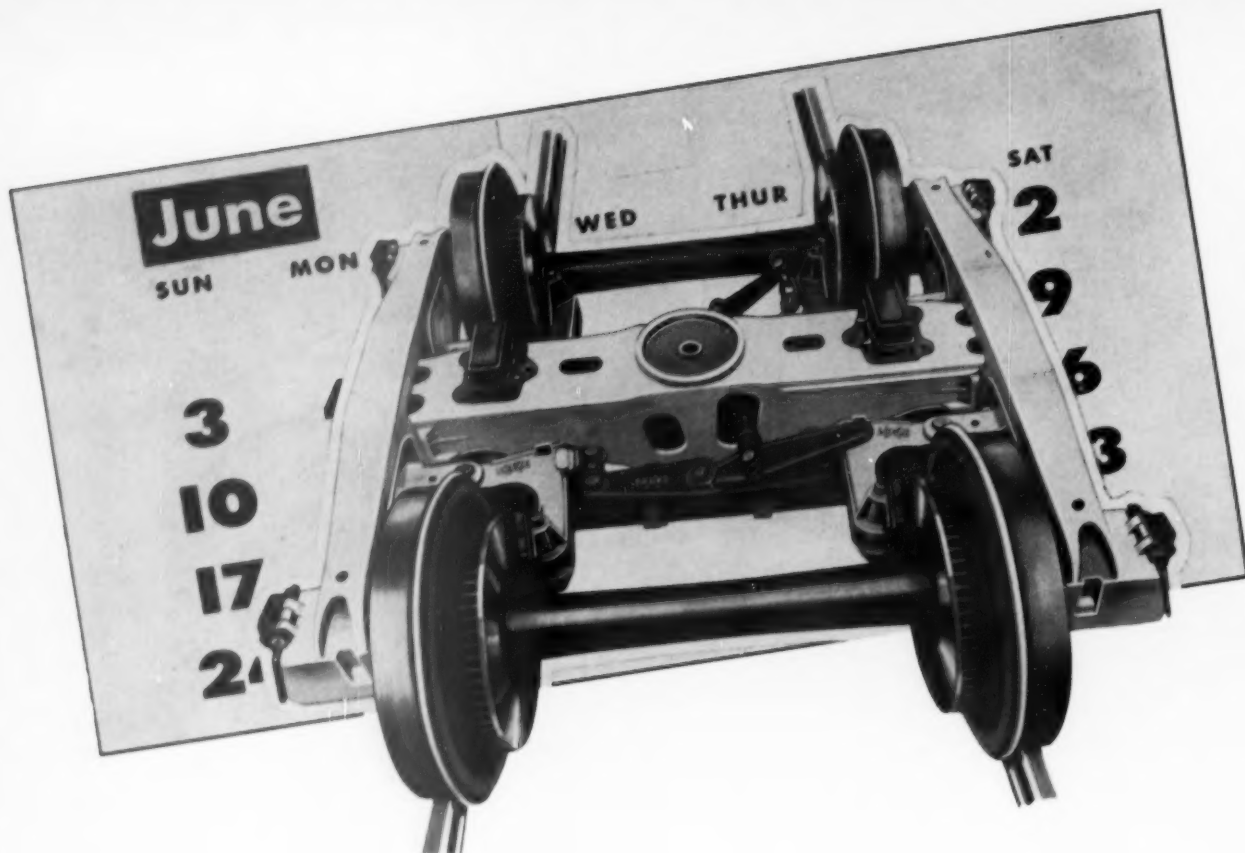


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"Safe-Grip"



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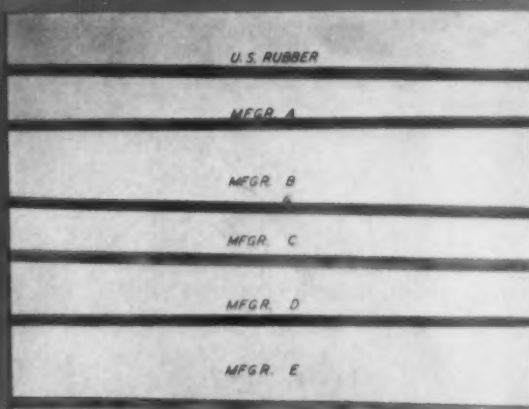
JUNE IS X-MONTH

June is the month when U. S. and Canadian railroads will start to take deliveries on freight cars equipped with Buffalo's new Brake-X Single Disc Trucks, the first freight car braking system to completely eliminate brake beams . . . Watch for the announcement of the world's first Brake-X car in regular service in the June 18th issue of Railway Age.

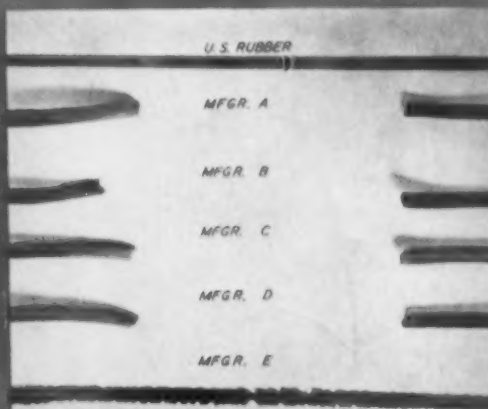
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NEW YORK • BUFFALO



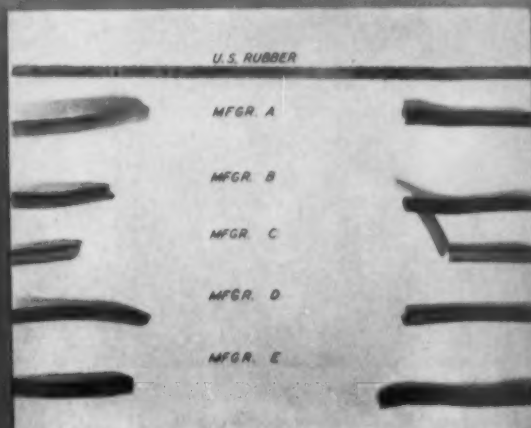
Grizzly High Voltage Power Cables



Here are 6 samples of widely used competitive neoprene jackets (stretched 200% of original length) at start of test for ozone resistance.



2 hours, 23 minutes after start. Brand "E" is disintegrating. Brand "B" has failed 15 minutes ago; the other brands failed an hour or more before.



Taken 7 hours after start of test—Brand "E" failed after 2 hours, 30 minutes. U. S. Grizzly Power Cable's jacket showed practically no sign of damage. It did not fail until after 18 hours of exposure.

Proved far and away
the winner in an
Ozone test
of 6 leading
competitive jackets!


U. S. Grizzly® High Voltage Power Cables are unmatched in performance, durability and all-around economy. Order these superior cables from your "U. S." branch, distributor or write Electrical Wire & Cable Department, United States Rubber Company, Rockefeller Center, New York 20, N. Y.

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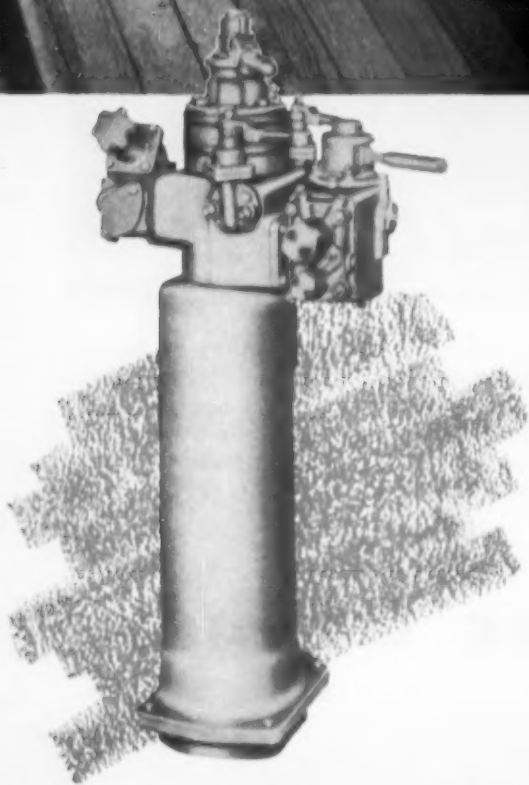


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RAILWAY LOCOMOTIVES AND CARS

Founded in 1832 as the American Rail-Road Journal

JUNE, 1956

VOLUME 130, No. 6

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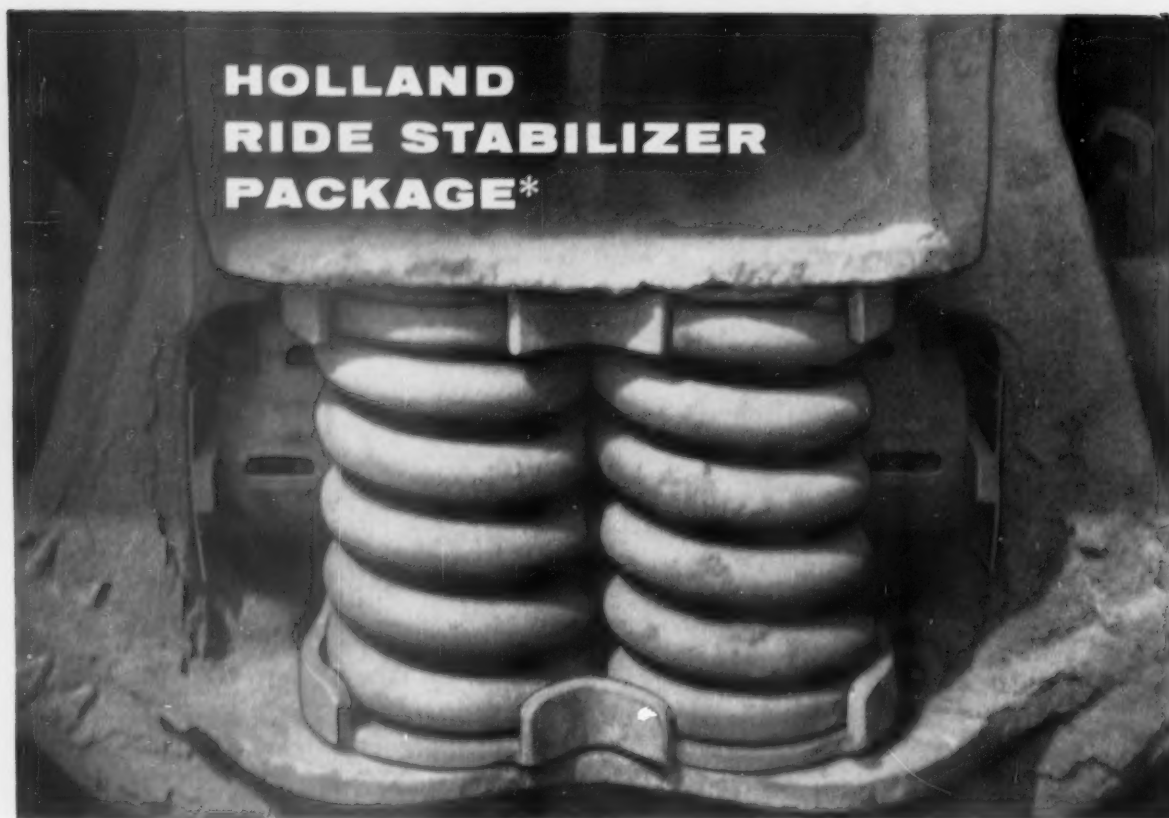
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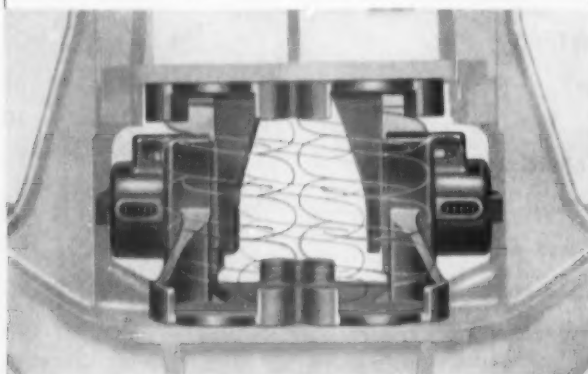


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For several months, the Holland Ride Stabilizer Package has been giving a very good account of itself in actual service, under some of the most severe conditions that a freight car can undergo.

Holland Ride Stabilizer Packages are in daily service in refrigerator cars of a major railroad line. Here, these "packages" encounter salt brine dripping and other extremely corrosive conditions far more severe than are met in the usual freight car operation. Full details of the tests and the "package" will be gladly sent on request.

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Parts Cleaner

An addition to a line of batch type mechanically agitated cleaning machines is the Roll-O-Matic Metal Laundry. This machine automatically washes, rinses, rust-protects and dries small metal parts, such as acorn nuts, screw machine parts and fittings. It is said that not only oils and

other industrial soils are removed, but also loose chips, which eliminates hand scrubbing and an air blow off.

The dirty parts to be treated are loaded in a revolving drum, attached to an air cylinder tank. The parts are rotated in the wash solution for a predetermined period, followed by a spray rinse, then a rotating anti-rust treatment and finally a hot air dry. Washing and anti-rusting solutions are salvaged for reuse. After completion of the final liquid or dry stage the drum is automatically raised.

The unloading chute, which is attached to the drum, then lowers. The operator opens the door on the drum and the parts are dumped on the chute and slide to a tote box or pan. The Roll-O-Matic Metal Laundry can be fabricated to accomplish as many chemical or liquid stages as required. It does not need a special pit or foundation. *Magnus Chemical Company, Equipment Division, Dept. RLC, Garwood, N. J.*



Long-Life Batteries

The batteries, which feature high instantaneous discharge rates, have been designed for stationary power applications in railway, industrial plants, etc. They are enclosed in heat-resistant polystyrene jars. Insulation between plates of opposite polarity consists of one-piece polystyrene dowels and microporous rubber separators.

The jars are designed so as to provide increased volume of electrolyte. Additional electrolyte reduces the need for water addition to replace evaporation. An exclusive feature is the positive plate consisting of a cast lead antimony grid into which buttons of pure lead are permanently locked and then coated electrochemically with lead peroxide. *Exide Industrial Division, Electric Storage Battery Company, Dept. RLC, Box 8109, Philadelphia 1.*



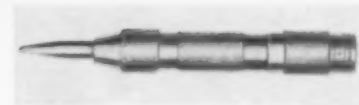
Brass Trimmer Jacks Car Body

The self-propelled combination journal jack and brass trimmer, the Yu-Brasser, has been redesigned. The improvements include a carlift extension for the journal jack, dual wheels front and rear, and center mounting of the brass shaper.

The Yu-Brasser is a complete mobile car inspection unit, hydraulically driven and operated. With it, one man can jack up journal boxes, remove and trim brasses, open oil rolls and replace brasses. The car lift extension makes it possible to also lift the car weight off the side bearing and center plate for inspection and greasing. This car lifting extension fits on the Yu-Brasser journal jack. The operator con-

trols spotting and lifting of the extension from the steering platform. Center plate inspection and greasing has been done in about nine minutes. Extension height is adjustable so no blocking is necessary, and the jack can be released only from operating platform.

Dual wheels front and rear increase Yu-Brasser stability and improve operation on unpaved surfaces. Shaper for trimming journal brasses is now mounted lengthwise of the Yu-Brasser hood so it may be used equally well from either side. Hood serves as handy work bench. *Yuba Manufacturing Company, Dept. RLC, 55 New Montgomery st., San Francisco 5, Calif.*



Automatic Center Punch

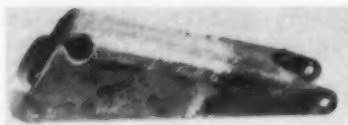
This center punch features a lightweight aluminum handle and an automatic striking mechanism with adjustable striking force. No hammer is needed to use this center punch. It is only necessary to press the handle and a built-in mechanism strikes a center mark. The force of the blow is regulated by turning a knurled cap down to increase the blow, and up for lighter indentations. Once set to the desired force, the punch will strike a mark of the same depth every time. All working parts of the automatic center punch are hardened

EQUIPMENT . . NEW IDEAS . . NEW USES

tool steel. The point is removable for sharpening or replacement. Three diamond knurled bands on the aluminum handle provide a comfortable grip. A similar automatic punch with a beveled-edge self-centering locating sleeve is available for centering holes through hinges and other hardware and also for centering counter-sunk holes. *L. S. Starrett Company, Dept. RLC, Athol, Mass.*

Alkaline Cleaner

An alkaline material for the removal of rust, paint and primer in one dip and rinse operation has been named Turco Alkaline Rust Remover. The powdered compound is claimed to eliminate four of the six steps



required for rust and paint removal by conventional methods. This rust remover is said to take off light rust in less than a minute. Heavy rust and multiple paint layers usually require only a few minutes immersion. Even such paint deposits as red oxide primer, baked lacquer, acid-proof paint and asphalt finishes yield to this material.

Turco Alkaline Rust Remover contains no cyanide compounds. It does not require complicated electrolytic equipment nor does it emit corrosive fumes. Hazards

commonly encountered when charging acid tanks are eliminated. It is said that it will not affect dimensional tolerances or cause hydrogen embrittlement. After cleaning, no after neutralization is required—only pressure rinsing. Metals cleaned with acids will normally re-rust unless they are further processed or coated with a rust preventive. Metals de-rusted with Turco Alkaline Rust Remover are said to be no more subject to rusting than is new metal.

Railroad cleaning jobs using this material include diesel exhaust manifolds and "A" frames, injector parts, steam generator coils, stockpiled castings, stored parts, and protected and unprotected cold and hot rolled steel. *Turco Products, Inc., Dept. RLC 6135 South Central Avenue, Los Angeles 1.*

Mechanical Refrigeration System

Compressors that combine two stages in one compressor and achieve the compound compression with internal manifolding of the cylinders have now been used in mechanical refrigerator cars.

Refrigerant vapor enters the three first-stage cylinders where it is compressed. After leaving the first-stage cylinders the refrigerant gas passes to the single second stage, or high-pressure cylinder, where there is further compression. Intercooling or desuperheating of the hot discharge vapor from the first-stage cylinders is accomplished by injection of cooled liquid-laden vapor from the automatic thermostatic expansion valve. The thermostatic bulb for this expansion valve is located in the suction side of the second-stage head. Temperature of the gas is controlled before

it enters high-stage cylinder thereby preventing excessive discharge temperatures.

Two of the first-stage cylinders are equipped with gas operated unloaders, which are used for start-up and capacity control of the compressor. During the start-up the unloader fingers hold open the suction strips and are held in this position for approximately 13 sec. Then a time delay relay will allow discharge gas pressure to overcome hold-down spring action and lift the unloader fingers from the suction valve strips.

The construction of these two-stage compressors is such that it is impossible to bypass the low stage during pulldown, which is normal practice with conventional two-compressor systems. Unless the suction pressure is throttled, which can lead to

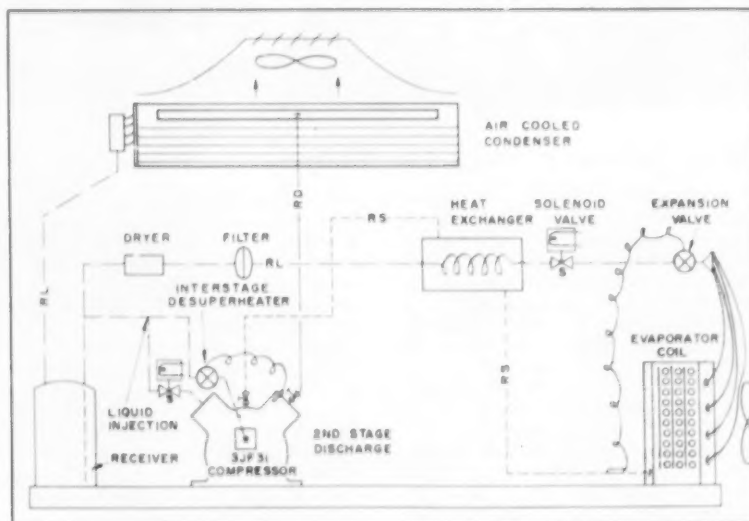
complicated controls, the compressor will have to be motored for the maximum conditions during pulldown. This was not the case with these two-stage compressors as the unloaders on the two first-stage cylinders reduce the horsepower requirements.

These two-stage compressors are designed not only to prevent high compression ratios but also because air-cooled condensers are used. The resulting operating pressures and temperatures are too high for single-stage equipment to be used for this type of application, which is subject to extremes in operating complications. *Worthington Corporation, Dept. RLC, Harrison, N. J.*

(Turn to page 96)



Two-stage compressor (above) is heart of the complete refrigeration system shown schematically at the right.





HAULING A LOAD...REPAIRING THE ROAD

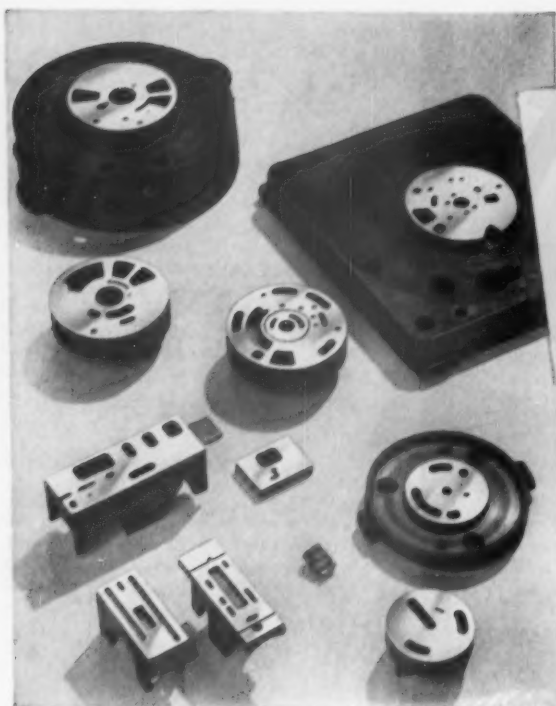
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With a

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Air brake valve parts like these are being production lapped on JOHN CRANE Lapmasters every day at a tremendous savings in time and money. For instance, one of the rotary valve seats shown here formerly required over two hours of lapping time to pass the "no leak" bubble test—time has now been cut to ten minutes on the Lapmaster.

This is the machine for you if you are looking for precision flatness and finish in quantity on all forms of ferrous and non-ferrous metal, ceramics, plastics or crystals. Lapmasters readily lap to the extremely close tolerance of one light band (.000011") or less. They also produce a fine finish to as low as 1 RMS.

You are invited to send us a few sample parts including surface finish specifications and approximate production requirements. Our lapping laboratory will then be in a position to provide you with complete facts on the application of the Lapmaster to your work. There is no obligation.

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In Canada: Crane Packing Co., Ltd., 617 Parkdale Ave., N.,
Hamilton, Ont., Canada



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Photographs courtesy of Le Tourneau-Westinghouse Company, a subsidiary of Westinghouse Air Brake Company.

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Company

Title

Address

Mechanical Division Meets June 27-28

The twenty-ninth annual meeting of the Mechanical Division, AAR, will be held June 26-28 at the Hotel Sherman, Chicago. It will convene with a joint session of the Mechanical Division and the Electrical Section of the Mechanical and Engineering Divisions. R. G. May, vice-president, Operations and Maintenance Department, will address the joint session beginning at 10 am, Daylight Saving Time, Tuesday, June 26. The Mechanical Division program will then continue as follows.

TUESDAY, JUNE 26
10 AM

Address by Chairman D. S. Neuhaert, general superintendent motive power and machinery, Union Pacific

Action on Minutes of 1955 Annual meeting
Appointment of Committees on Subjects, Resolutions, etc.

Unfinished business

New business

Report of General Committee

Report of Nominating Committee

Discussion of Committee Reports on:

Locomotives

Lubricants and Fuel for Diesel Locomotives

Axles

Geared Hand Brakes

Specifications for Materials
Safety Appliances

WEDNESDAY, JUNE 27
9:30 AM

Address by G. Murray Campbell, vice-president and executive representative, Baltimore & Ohio

Discussion of Committee Reports on:

Arbitration

Price

Car Construction

Passenger Car Specifications

Brakes and Brake Equipment

Couplers and Draft Cars

Loading Rules

Forest Products

THURSDAY, JUNE 28
9:30 AM

Address by The Honorable Owen Clarke, member, Interstate Commerce Commission

Discussion of Committee Reports on:

Wheels

Tank Cars

Journal Roller Bearings

Lubrication

Election of members of General Committee and Committee on Nominations

Report of Committee on Resolutions

diesels last year accounted for 85.52% of the gross ton-miles of freight service performed by Class I railroads. That compared with 84.47% in 1954. The coal burner's share was down from 11.62% to 10.72%. Oil burning steam locomotives and electrics each accounted for less than 2% of 1955 freight service.

Bad Order Cars at 8-Year Low

The present percentage of bad-order cars is the lowest since January 1, 1948, William T. Faricy, president of the Association of American Railroads, announced recently.

Railroads, he said, with only 4.1% of their freight cars awaiting or undergoing repairs, are within 1,700 cars of bringing the ratio of bad orders down to the 4% ownership goal announced last November.

As a result of the program of repair and upgrading in recent months, the supply of serviceable freight cars is 23,550 more than it was a year ago. The increase, he emphasized, has been achieved in spite of the fact that in the past year more freight cars were scrapped than were built, with a decline in total ownership from 1,726,626 units to 1,696,544. This downward trend in ownership was reversed during the first quarter of 1956, when 14,650 cars were built and only 11,450 were scrapped.

Although the coming months are expected to see gains in total ownership and the number of serviceable cars available for shippers, depending upon availability of steel and other materials, there will not be enough cars to meet all demands during the seasons of heavy shipping, Mr. Faricy said.

Shortages are expected in virtually all types of service and in all sections of the country.

Diesel Fuel-Cost Drops

While the showing was less favorable than their 1954 record, diesel-electric freight locomotives last year produced 66% more gross ton-miles per dollar of fuel expense than coal-burning steam locomotives. In 1954 each dollar spent for diesel fuel produced 80% more gross ton-miles than the coal-buying dollar.

This comparison was made in "Transport Economics," publication of the ICC Bureau of Transport Economics and Statistics.

The figures also showed the 1955's diesel-fuel dollar produced about 85% more gross ton-miles than each dollar spent last year for current for electric locomotives. A dollar spent for fuel for oil-burning steam locomotives produced less than half as many gross ton-miles as the diesel-fuel dollar.

The 1955 figures for diesels showed that they produced 5,496 gross ton-miles per dollar of fuel expense. That compared with 3,310 gross ton-miles for coal-burning steam locomotives, 2,038 gross ton-miles for oil burners, and 2,969 gross ton-miles for electrics. All of these were higher than comparable figures for 1954. Meanwhile, unit costs for all fuels were down, except for a 2.04% rise in the per-barrel cost of fuel oil. The per-gallon cost of diesel fuel was down 1.6%, and coal and electric

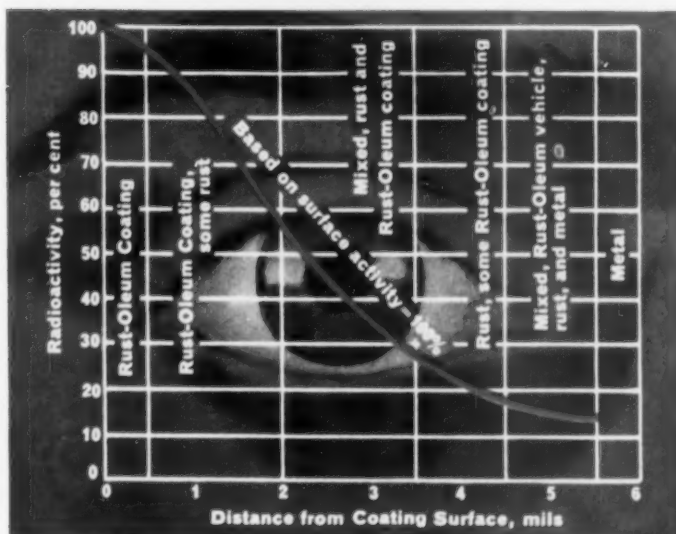
current costs per ton and per kilowatt hour, respectively, were down 0.37% and 2.86%.

The bureau's figures also showed that

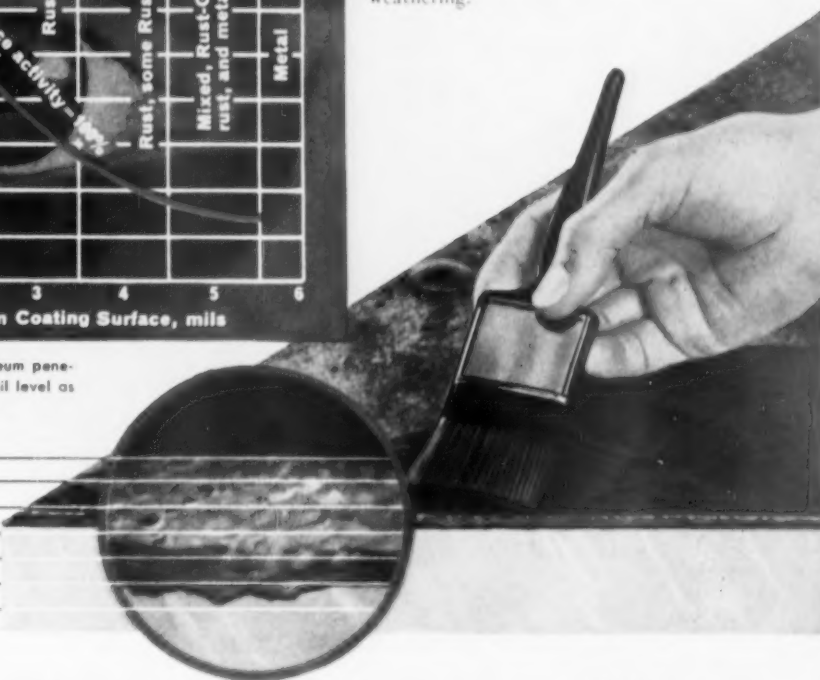
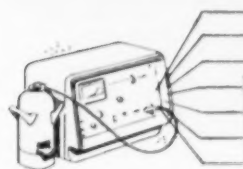
SUMMARY OF MONTHLY HOT BOX REPORTS

	Foreign and system freight car mileage (thousands)	No. of cars set off between division terminals because of hot boxes			Miles car set off
		System	Foreign	Total	
February, 1952.....	2,809,163	2,723	6,473	9,196	305,477
February, 1953.....	2,625,563	2,111	4,059	6,170	425,537
1954					
February.....	2,445,214	2,953	4,066	7,019	348,370
March.....	2,658,757	2,196	3,637	5,833	455,813
April.....	2,570,518	3,079	5,149	8,228	312,411
May.....	2,713,511	4,416	6,510	10,926	248,353
June.....	2,662,375	6,597	9,617	16,214	144,202
July.....	2,678,234	7,956	10,912	18,868	141,946
August.....	2,696,135	7,568	9,742	17,310	155,756
September.....	2,614,432	6,740	8,882	15,622	167,555
October.....	2,852,825	5,182	6,985	12,167	234,472
November.....	2,717,219	2,515	3,467	5,982	454,232
December.....	2,751,644	1,501	2,294	3,795	725,670
1955					
January.....	2,714,070	1,813	2,701	4,514	601,256
February.....	2,517,483	2,266	3,970	6,236	463,701
March.....	2,830,390	2,717	5,076	7,793	363,197
April.....	2,787,705	3,471	6,485	9,956	289,002
May.....	2,931,850	4,860	8,664	13,524	216,788
June.....	2,945,955	6,080	10,226	16,306	180,666
July.....	2,906,558	8,086	13,635	21,721	133,813
August.....	2,954,439	8,555	14,358	22,913	128,941
September.....	3,923,592	5,896	10,469	16,365	178,649
October.....	3,025,177	3,966	7,182	11,148	271,364
November.....	2,950,228	2,010	3,972	5,982	463,184
December.....	2,922,034	1,819	3,774	5,593	522,444
1956					
January.....	2,925,109	2,029	4,302	6,331	462,029
February.....	2,794,161	2,570	5,611	8,181	341,542

See Rust-Oleum penetrate rust to bare metal through the "Eyes" of Radioactivity!



Curved line illustrates Rust-Oleum penetration through rust at each mil level as recorded by Geiger Counter.



Rust-Oleum dries to a firm, decorative coating that resists salt water, sun, fumes, heat, humidity, and weathering.

Geiger Counter traces Rust-Oleum penetration to bare metal! In nearly three years of radioactive research, Rust-Oleum's *specially-processed* fish oil vehicle was radio-activated and formulated into Rust-Oleum 769 Damp-Proof Red Primer — then applied to rusted test panels. Rust-Oleum's specially-processed fish oil vehicle was then traced through the rust to bare metal by Geiger Counter.

This penetration means rust-stopping power, because the fish oil vehicle works its way into the tiny pits in the metal where it drives out air and moisture that cause rust. Important savings are yours, because Rust-Oleum can be applied directly over sound rusted surfaces — usually eliminating costly surface preparations. Attach coupon to your business letterhead for your copy of the thirty-page report entitled, "The Development of a Method To Determine The Degree of Penetration of a Rust-Oleum Fish-Oil-Based Coating Into Rust On Steel Specimens," prepared by Battelle Memorial Institute technologists.



*There is only one Rust-Oleum.
It is distinctive
as your own fingerprint.*

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- ☐ Thirty-page report on Rust-Oleum penetration.
- ☐ Nearest source of supply.



Roads Vote End for Loose Journal Box Packing

Loose journal box packing is to be banned from all plain-bearing freight cars in interchange service following letter ballot approval for this action given by AAR members. The General Committee of the Mechanical Division has set the effective date for this step as January 1, 1960, noting that it may be necessary to extend it if conditions warrant. Interested AAR Mechanical Division committees have been instructed to prepare the necessary rules changes and revised regulations.

The March 5 letter ballot produced "in favor" votes from the owners of 1,204,217 freight cars, "against" votes for 719,115 cars, and no ballots from the owners of 24,919 cars. The letter ballot defined "loose journal box packing" as "(1) Mass waste packing in boxes with or without packing retainers. (2) Mass waste packing in boxes with integral or bolted on journal stops. (3) Hand or machine made roll packing as in (1) and (2) above." Not considered loose journal box packing are "(A) Waste used in pads where thread ends are secured by stitching or plastic attachment to pad. (B) Mass waste packing used in containers such as Plypak."

The General Committee decided that rather than submit a series of specific rules changes, that the broad principles would be outlined in the ballot. It was intended that member roads should first give approval to the basic change and at the same time offer suggestions which would allow this change to be instituted in an orderly manner. The General Committee recommendation read "To adopt as AAR Standard Practice the use of approved designs of journal lubricating devices in lieu of loose journal box packing, this requirement to become effective for all freight cars with plain bearings built new, rebuilt, or receiving heavy repairs to the extent of 100 man-hours or more on and after January 1, 1957, and for all such cars in interchange service on and after January 1, 1960."

Comments accompanying the ballots led the Committee to move the effective date for new, rebuilt and repaired cars from January 1 to August 1, 1957. No change has been made in the 1960 date for blanket application and the Committee stated that every effort should be made to meet this date.

Flowrator Mandatory in '57

The Flowrator is to become a standard part of the Freight Car Single Car Testing Device effective January 1, 1957. Letter ballot approval has been given to the Flowrator which is intended to materially aid in reducing brake system leakage while speeding and simplifying the brake test. A kit is available to convert present testing devices. The AAR pointed out that it is not necessary immediately to replace the 4½-in air gauge which is the standard on the new tester. Supplement 1 for Instruction Pamphlet 5039-4 which has been written for the new tester is ready for distribution, but the old edition must be retained as long as the old style testing device is in use.

ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED SINCE THE CLOSING OF THE MAY ISSUE

DIESEL-ELECTRIC LOCOMOTIVE ORDERS

Road and builder	No. of units	Horse-power	Service	Other detail
BRITISH COLUMBIA ELECTRIC RY., General Motors Diesel.....	2	900	.....	For July delivery. Estimated cost, \$280,000.
NEW YORK CENTRAL: Electro-Motive.....	30	1,750	Road switching	September delivery.
NORTHERN PACIFIC: Electro-Motive.....	20	.....	Freight	Purchase of these 80 units authorized by board of directors last November.
	3	.....	Passenger	
	49	.....	Road switching	
	17	.....	Switchers	
TEXAS & PACIFIC: Electro-Motive.....	6	.....	Road switching	GP-9 type. For April 1957 delivery

FREIGHT-CAR ORDERS

Road and builder	No. of cars	Type	Cap., tons	Length, ft.	Other detail
ATLANTIC COAST LINE: ACF Industries.....	800	Pulpwood	70	..	Cast-steel underframe. Delivery to begin in Nov.
	800	Cement hopper	70	..	Delivery to begin first quarter 1957.
Greenville Steel Car.....	200	Phosphate rock hopper	70	..	Delivery to begin second quarter 1957. All 1,000 cars to be equipped with roller bearings.
GRAND TRUNK WESTERN: ACF Industries.....	400	Automobile	50	..	Delivery to begin fourth quarter this year.
Magor Car.....	100	Flat	70	..	Delivery to begin first quarter 1957.
ST. LOUIS SOUTHWESTERN: Company shops.....	50	Flat	70	60-0	Cast-steel underframes. Estimated cost, \$551,000. Delivery expected to begin in October.
UNION TANK CAR CO.: Company shops.....	45	Tank	..	..	10,600 gal.
	20	Tank	..	..	10,000 gal.
	10	Tank	..	..	8,000 gal. Delivery of 75 cars expected first quarter 1957.

PASSENGER-CAR ORDERS

Road and builder	No. of cars	Type of car	Other detail
NORTHERN PACIFIC: Budd Company.....	1	RDC-3	Delivery in October. Approximate cost, \$170,000.

INQUIRIES AND NOTES

LOCOMOTIVES:

New York, New Haven & Hartford.—Two Mech-hydro locomotives for Train X will be delivered shortly. Baldwin-Lima-Hamilton has announced. NH units, although similar to New York Central locomotive recently delivered, will be equipped to operate also in the NH's electrified territory.

LIGHTWEIGHT TRAINS:

Chicago, Rock Island & Pacific.—Clarifying recent reports, D. J. Jenks, RI president, says the road will watch performance of all lightweight trains and, perhaps in a year or two, "might conceivably" replace one of its "Rockets" with new-type light weight equipment.

FREIGHT CARS:

Seaboard Air Line.—SAL has purchased cast-steel bodies and steel frames for three 125-ton depressed center flat cars to be assembled in company shops. Approximate cost of each car, \$35,000. Completion expected by end of July.

Personal Mention

Canadian National

JAMES TAGGART, assistant diesel supervisor at Winnipeg, appointed mechanical engineer (diesel). Headquarters, Montreal.

S. H. NOEL appointed assistant mechanical engineer, Atlantic Region. Headquarters, Moncton, N.B.

Denver & Rio Grande Western

R. M. McLEAN, assistant chief mechanical officer at Denver, retired.

A. N. BISCARD, division locomotive foreman, appointed assistant chief mechanical officer at Denver.

Baltimore & Ohio

CHARLES H. SPENCE, superintendent of shops at Mt. Clare shops, Baltimore, Md., retired.



J. J. Ekin, Jr.

JOHN J. EKIN, JR., assistant to the general superintendent of motive power and equipment, appointed superintendent of



Dearborn 2-Bed De-Ionizing Plant.

DEARBORN DE-IONIZING UNITS SUPPLY MINERAL-FREE WATER

This Dearborn De-Ionizing Plant produces 75,000 gallons of de-mineralized water daily. It reduces the mineral content in the water to the equivalent of that produced by distillation—at less cost. The unit is equipped with Saran-lined steel pipe, as well as rubber-lined tanks and valves.

Whether you require a manual, semi-automatic or fully automatic system, Dearborn gives you the properly designed unit to do the job.

When specifications call for mineral-free water, see Dearborn for a quotation.

The complete Dearborn line includes De-Ionizing Units, Zeolite Softeners, and Treatment Feeding Equipment to meet all requirements.

Dearborn
SPECIALISTS IN WATER CONDITIONING
AND CORROSION CONTROL SINCE 1887

USE THE COUPON FOR ADDITIONAL INFORMATION

Dearborn Chemical Company, Dept. RL,
Merchandise Mart Plaza, Chicago 54, Ill.

Please send me information on Dearborn's

- ☐ De-Ionizing Units
- ☐ Zeolite Softeners
- ☐ Treatment Feeding Equipment

Name Title

Company

Address

City Zone State

shops at Mt. Clare, Baltimore, Md. *Career:* Entered B&O service in 1924 as a helper-machinist, serving at Mt. Clare shops, Keyser, W. Va., and at Riverside. On leave of absence from B&O from 1933 to 1946 when he became a motive-power inspector. Subsequently supervisor of lubrication, supervisor of shops, and assistant to the general superintendent of motive power and equipment.

Boston & Maine

CLYDE R. SMITH, mechanical inspector at Boston, appointed superintendent of car shops at Concord, N. H., with jurisdiction over car forces at Concord station and Manchester.

JAMES A. HESELTON, general foreman car department at White River Junction, Vt., appointed general foreman at Boston passenger terminal, East Cambridge, Mass.

FRED C. WILLIAMS, general foreman at Boston passenger terminal at East Cambridge, Mass., retired.

CLIFTON E. PLAMONDON, superintendent at Concord, N. H., shops, appointed general car foreman at White River Junction, Vt.

Canadian National

C. E. STEWART, superintendent motive power and car equipment, British Columbia district, at Vancouver, B. C., retired.

ROBERT M. COWAN, superintendent motive power shops at Fort Rouge, Man., appointed superintendent motive power and car equipment, British Columbia district, at Vancouver, B. C.

JAMES L. SMITH, superintendent, Transcona motive-power shops, Winnipeg, Man., appointed superintendent of motive power and car equipment, Saskatchewan district, at Saskatoon, Sask.

STANLEY BACHINSKY, acting superintendent of the Transcona motive-power shops, Winnipeg, Man., appointed superintendent motive-power shops at Fort Rouge, Man.

KENNETH W. THOMPSON, general foreman, Stratford shops, appointed superintendent motive-power shops at Transcona, Winnipeg, Man.

Columbus & Greenville

W. A. TRAYLER, JR., master mechanic, appointed superintendent motive power and equipment, at Columbus, Miss.

Erie

M. F. COFFMAN, appointed assistant chief of research at Cleveland, Ohio. Position of assistant to chief of research abolished.

Georgia & Florida

P. W. MORGAN appointed master mechanic, in charge of maintenance equipment department, at Douglas, Ga.

Long Island

R. P. TURNBULL appointed mechanical engineer, with jurisdiction over mechanical engineering and test activities. Headquarters, Morris Park Shops, N.Y.

New York Central

J. E. SALERNO appointed shop and equipment inspector. Headquarters, Syracuse, N. Y.

New York, Chicago & St. Louis

J. E. ACKERMAN appointed car foreman at South Lorain, Ohio. W. W. IRESON appointed roundhouse foreman at Bellevue, Ohio. A. E. MILLER appointed assistant road foreman of engines. Headquarters, Cleveland.

Norfolk & Western

C. W. LEWEY, night roundhouse foreman at Bluefield, appointed day roundhouse foreman.

D. C. GRISSO, assistant roundhouse foreman at Bluefield, appointed night roundhouse foreman.

K. S. LUCAS, foreman at Iarger, W. Va., appointed assistant roundhouse foreman at Bluefield.

A. J. GRAHAM, JR., foreman at Durham, N. C., appointed foreman at Iarger, W. Va.

H. G. GILLESPIE, JR., mechanical inspector at Roanoke, Va., appointed foreman at Durham.

W. O. HUNT, JR., shop inspector at Shaeffers Crossing, appointed mechanical inspector.

Northern Pacific

G. L. ERNSTROM, general mechanical superintendent at St. Paul, retired.

J. A. CANNON, superintendent of motive power at Seattle, appointed general mechanical superintendent at St. Paul.

F. W. TAYLOR, superintendent of motive power at St. Paul, appointed superintendent of motive power at Seattle.

O. J. MURPHY, master mechanic, appointed superintendent of motive power at St. Paul.

(Continued on page 88)

SELECTIVE MOTIVE POWER AND CAR PERFORMANCE STATISTICS

FREIGHT SERVICE (DATA FROM I.C.C. M-211 AND M-240)

Item No.		Month of February		2 months ended with February	
		1956	1955	1956	1955
3	Road locomotive miles (000) (M-211):				
3-05	Total, steam.....	4,113	4,618	8,712	9,414
3-06	Total, Diesel-electric.....	35,696	31,875	72,780	66,041
3-07	Total, electric.....	704	634	1,440	1,332
3-04	Total, locomotive-miles.....	40,731	37,316	83,374	77,189
4	Car-miles (000,000) (M-211):				
4-03	Loaded, total.....	1,623	1,469	3,287	3,004
4-06	Empty, total.....	876	813	1,833	1,723
6	Gross ton-miles-cars, contents and cabooses (000,000) (M-211):				
6-01	Total in coal-burning steam locomotive trains.....	10,048	10,431	20,895	20,964
6-02	Total in oil-burning steam locomotive trains.....	962	1,175	2,372	2,414
6-03	Total in Diesel-electric locomotive trains.....	101,626	80,773	206,189	183,001
6-04	Total in electric locomotive trains.....	2,128	1,901	4,313	4,004
6-06	Total in all trains.....	115,519	102,922	235,295	211,734
10	Averages per train-mile (excluding light trains) (M-211):				
10-01	Locomotive-miles (principal and helper).....	1.03	1.02	1.03	1.02
10-02	Loaded freight car-miles.....	42.8	42.1	42.4	41.6
10-03	Empty freight car-miles.....	23.1	23.3	23.6	23.9
10-04	Total freight car-miles (excluding cabooses).....	65.9	65.4	66.0	65.5
10-05	Gross ton-miles (excluding locomotive and tender).....	3,047	2,951	3,032	2,935
10-06	Net ton-miles.....	1,399	1,328	1,384	1,309
12	Net ton-miles per loaded freight car-mile (M-211).....	32.7	31.5	32.7	31.4
13	Car-mile ratios (M-211):				
13-03	Per cent loaded of total freight car-miles.....	64.9	64.4	64.2	63.5
14	Averages per train hour (M-211):				
14-01	Train miles.....	18.6	18.8	18.7	19.0
14-02	Gross ton-miles (excluding locomotive and tender).....	56,078	55,085	56,056	55,310
14	Car-miles per freight car day (M-240):				
14-01	Serviceable.....	46.9	44.9	46.4	44.1
14-02	All.....	45.0	42.1	44.5	41.3
15	Average net ton-miles per freight car-day (M-240).....	955	854	934	825
17	Per cent of home cars of total freight cars on the line (M-240).....	41.5	50.5	41.8	51.6

PASSENGER SERVICE (DATA FROM I.C.C. M-213)

3	Road motive-power miles (000):				
3-05	Steam.....	806	1,224	1,806	2,663
3-06	Diesel-electric.....	19,374	19,103	40,114	40,365
3-07	Electric.....	1,222	1,274	2,545	2,689
3-04	Total.....	21,403	21,602	44,466	45,717
4	Passenger-train car-miles (000):				
4-08	Total in all locomotive-propelled trains.....	218,767	215,319	454,057	458,826
4-09	Total in coal-burning steam locomotive trains.....	4,813	7,230	10,706	15,638
4-10	Total in oil-burning steam locomotive trains.....	1,822	2,578	4,345	6,439
4-11	Total in Diesel-electric locomotive trains.....	197,022	190,998	408,380	406,091
12	Total car-miles per train-mile.....	9.80	9.61	9.80	9.67

YARD SERVICE (DATA FROM I.C.C. M-215)

1	Freight yard switching locomotive-hours:				
1-01	Steam, coal-burning.....	243,213	236,284	502,821	875,274
1-02	Steam, oil-burning.....	25,717	37,790	54,650	79,623
1-03	Diesel-electric.....	3,738,334	3,297,275	7,633,514	6,783,294
1-06	Total.....	4,010,171	3,578,073	8,196,992	7,351,733
2	Passenger yard switching hours:				
2-01	Steam, coal-burning.....	6,465	9,435	14,185	19,243
2-02	Steam, oil-burning.....	2,285	4,940	5,625	9,326
2-03	Diesel-electric.....	236,842	230,381	499,012	487,640
2-06	Total.....	272,604	268,531	562,218	566,364
3	Hours per yard locomotive-day:				
3-01	Steam.....	6.0	4.8	6.0	4.6
3-02	Diesel-electric.....	16.2	15.6	15.9	15.9
3-05	Serviceable.....	16.2	15.4	16.0	15.0
3-06	All locomotives (serviceable, unserviceable and stored).....	14.5	13.2	14.3	12.9
4	Yard and train-switching locomotive-miles per 100 loaded freight car-miles:				
4	Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives).....	1.71	1.69	1.72	1.69
5	Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives).....	.77	.77	.76	.76

Excludes B and trailing A units.



World's most powerful wheel rolling mill—

puts extra mileage in

EDGEWATER WHEELS

The homogeneous structure of the steel in Edgewater railroad wheels is an important factor in producing maximum service life. This characteristic is the result of advanced metallurgical practices which insure the quality of steel and carefully control the heating and forging operations. Without reheating, Edgewater's rolling process expands the rim to size and forms the flange.

Every step in the manufacture of Edgewater Rolled Steel Wheels is carefully controlled to insure the optimum properties in the finished product.

The photograph shows a rolled wheel being removed from the rolling mill. After controlled cooling and when specified, heat treating, Edgewater Railroad Wheels are machined to exacting A.A.R. standards.



Edgewater Steel Company PITTSBURGH 30, PA.

Makers of Rolled Steel Wheels for Freight Cars,
Passenger Cars and Diesel Locomotives

WE CARRY THE HEAVY SPARES

**AND SAVE
RAILROADS
AN INVESTMENT
OF MILLIONS**

**THAT'S ELECTRO-MOTIVE
"UNIT EXCHANGE"!**

PURCHASE of 100 traction motors as shop float by one railroad represents an investment of approximately \$500,000. Annual return on such an investment at 6% amounts to \$30,000.

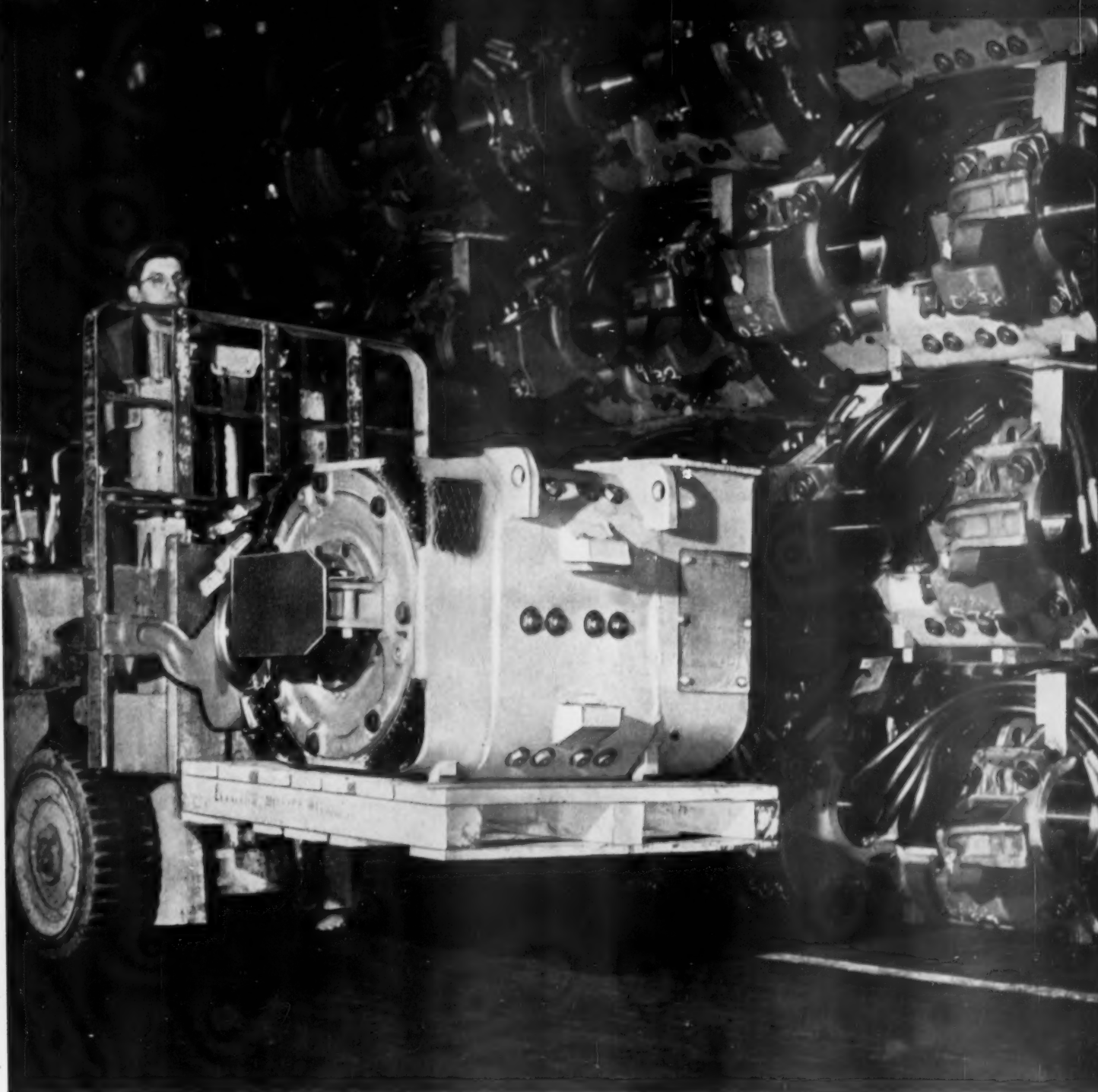
Railroads who take advantage of Electro-Motive "Unit Exchange" can put the money to more productive uses, because "Unit Exchange" not only reduces parts inventories considerably, but often saves unnecessary investment in additional shop facilities.

When traction motors or other major Diesel locomotive components need rebuilding, you simply call for a "Unit Exchange" assembly.

The remanufactured unit you receive incorporates all of the latest design and engineering improvements—and is backed by the same warranty as a brand-new assembly—in some cases double the warranty of the original!

The price you pay is the cost of putting the unit you send us into the same first-class condition as the one you received. And the flat-rate charges made possible by volume production with specialized machinery and tools are the lowest you'll find anywhere.

Ask your Electro-Motive Representative for full information on "Unit Exchange."



ELECTRO-MOTIVE DIVISION

GENERAL MOTORS • LA GRANGE, ILLINOIS
Home of the Diesel Locomotive



In Canada: GENERAL MOTORS DIESEL LIMITED, London, Ontario



"On-Line" Service for 96% of all
General Motors Locomotives in the United States



NEW!!



SINCLAIR JET LUBE POLY-BAGS

*...Greatest Advance in Traction
Motor Gear Lubrication History!*

All the Advantages of famous JET Lubricant-TM

...Now available in Expendable Polyethylene Bags

Just Drop the 1-pound Jet Lube Poly-Bag into Gear Case—Bag Disintegrates and Becomes Part of the Grease Mass.

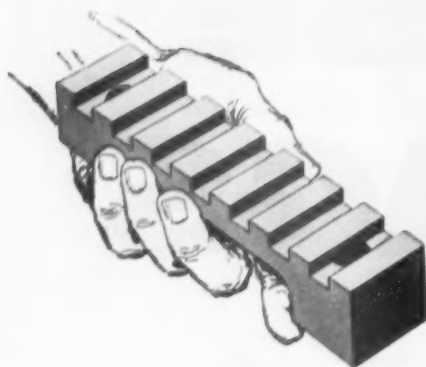
Tests by manufacturers and railroads prove you get:

- **Savings in Labor Costs**
- **Clean, Easy Handling**
- **More Miles per pound**
- **Assurance the job will be done**

SINCLAIR RAILROAD LUBRICANTS

For further information, contact Sinclair Refining Company, Railway Sales, New York, Chicago, St. Louis, Houston.

Improve the efficiency of any journal lubricator with Magnus R-S JOURNAL STOPS



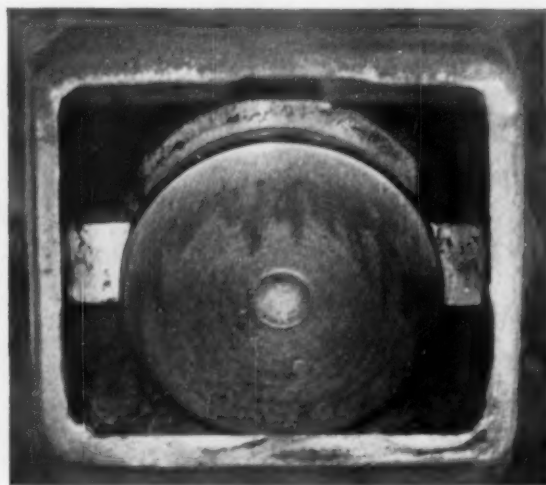
Longer bearing life and lower maintenance costs for trucks and journal boxes also yield big return on initial R-S Journal Stop investment

WITH conventional waste packing and Magnus R-S Journal Stops, you can run freight cars for *three years* between periodic servicing. That's been established by test experience to date.

Bolted to both sides of the journal box, the bronze bearing-metal Journal Stops form a permanent, built-in waste "container" that holds the mass of packing right where it belongs, even under severe braking and impact forces. And, unlike any other waste container or retainer, by keeping the bearing on the journal, you prevent short strands from being trapped beneath the bearing crown. By restricting fore-and-aft movement of the journal within the box, they prevent squashed-down waste packs, maintain constant journal-to-packing pressures, assure a uniform feed of oil to the bearing and eliminate danger of waste grabs.

But that's not all. You also get longer bearing life and freedom from spread linings. You reduce the requirements for an effective box rear seal and increase the efficiency and service life of present dust guards and seals. That's vital to the successful operation of most waste substitutes.

Pad and mechanical lubricators benefit too. By keeping



Here's proof of Journal Stops' unique ability to hold packing in place even under extreme service conditions. This unretouched photograph shows the interior of a Journal-Stop-equipped box after undergoing an 11½ mph flat-switching impact test. Waste is still firmly seated under the journal.

the journal in its proper position, you keep the box from rising during impacts and braking — don't crush the lubricator or seal. Axle dust guard seats can't be scored either.

WHAT ABOUT COST? One private car line estimates it has recovered more than 90% of the total cost of Stops and installation in just the first 20 months of operation. Other roads report comparable savings. R-S Journal Stops not only pay for themselves in reduced maintenance costs. They get cars to destination with trouble-free journal boxes. Write for complete information. Magnus Metal Corporation, 111 Broadway, New York 6 or 80 E. Jackson Blvd., Chicago 4.

MAGNUS
Solid Bearings

MAGNUS METAL CORPORATION

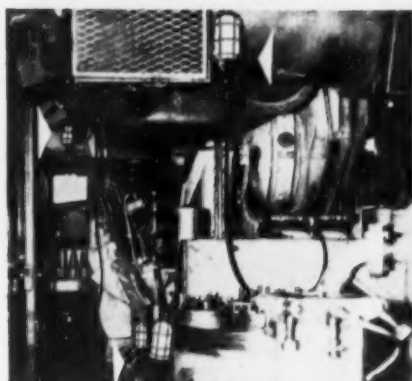
Subsidiary of **NATIONAL LEAD COMPANY**



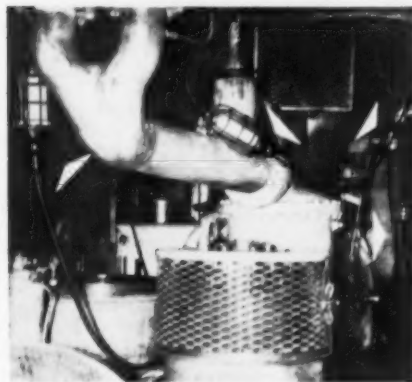


*Another
JOY First!*

Prefabricated LIGHTING and TOOL OUTLET Assemblies for DIESEL ENGINE MAINTENANCE



Left side of Diesel Engine
showing overhead portable
lights and handlamps.

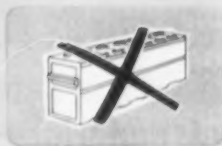


Right side of Diesel Engine
showing overhead portable
lights and handlamps.



At last... a practical answer to the electrical power and lighting needs of Diesel maintenance work. Provides up to 1000 watts of illumination and six correctly spaced electrical outlets for hand held power tools, around each engine. Eliminates battery drain and prolongs battery life because current used is provided from an external 110 volt A. C. power source. Each assembly is made up of the following one-piece molded Neoprene/rubber sections that interconnect quickly to meet any lighting or power outlet need. (1) MAIN LIGHT STRING... hangs over aisle along one side of engine. Has two 100 watt Vapor-proof light fixtures and three evenly spaced power outlets. (2) HANDLAMP EXTENSION (Vapor-proof)... Plugs into power outlets in main light string. (3) POWER EXTENSION... 50 feet over-all. Connects to outside 110 volt A. C. power. Has 3-way female plug for power distribution within Diesel Engine. Why light up Diesels with "candle power" now that proper working illumination is so economically available? Ask us for complete details.

Check These Advantages



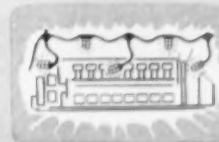
Eliminates drain on batteries. Uses 110 V current from external electrical source.



Provides up to 1000 watts of light for each Diesel engine being serviced.



Safe, Vapor-proof handlamp extensions plug into power outlets in main light string.



See it on Display!

... June 26 through 28 at the
Railway Electrical Supply Exposition
Booths 34 and 35, Hotel Sherman, Chicago



JOY

EXECUTIVE OFFICES - HENRY W. OLIVER BLDG., PITTSBURGH 22, PA.

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IN CANADA - JOY MFG. CO. (CANADA) LIMITED, GALT, ONTARIO

EXIDE-IRONCLAD BATTERIES

For railway car lighting and air conditioning



Actual photo taken during vibration torture test on an Ironclad Battery



Section of ironclad positive plate

Vibration can't loosen active material — can't shorten battery life

BATTERY FOR RAILWAY CAR LIGHTING AND AIR CONDITIONING. Model EHL. Write for Bulletin No. 5168.



When a heavy duty storage battery gets the "shake treatment," battery life is literally at the mercy of the bond between the positive grid and the active material. Heavy shedding means short life.

But look what happens in an Exide-Ironclad Battery. Active material is held firmly captive inside the plastic power tubes. Hair-thin slits let electrolyte in, but keep active material from falling out. In prolonged vibration tests, this unique design has proved to be a valuable battery life stretcher. These findings are confirmed in the long, dependable service of Exide-Ironclad Batteries in typical high-vibration applications.

This superior performance is only one of the many extra advantages in Exide-Ironclad Batteries — advantages that have earned them an unmatched reputation for long life and high capacity. When you order heavy duty batteries, or the equipment that requires them, be sure to specify Exide-Ironclad. Write for detailed bulletin, Exide Industrial Division, The Electric Storage Battery Company, Philadelphia 2, Pa.

Exide®

ASSOCIATION OF AMERICAN RAILROADS
CONNECTIONS AND MAINTENANCE DEPARTMENT
MECHANICAL DIVISION

Office of Secretary
20 East Van Buren Street
Chicago 5, Illinois

LETTER BALLOT CIRCULAR

Office of Secretary
20 East Van Buren Street

Chicago 5, March 5, 1955.

To the Members:

Under the direction of the General Committee of the Division, members of the Committee on Car Construction, Committee on Track Construction, and the General Committee itself, are working on the subject of loose waste and recommended practice and a separate proposition covering general changes in other mandatory rules of the Division are being submitted to you in this letter ballot circular.

A form of ballot is enclosed herewith. The ballot will be closed at noon, Central Time, Thursday, April 5, 1955. If it is impossible to return the ballot in order to reach the office prior to noon on April 5, will you please telegraph your vote so that it may be recorded. The form of ballot to be used is contained in this letter ballot circular.

In the event of voting separately on either of these questions, the General Committee requests that you submit with your ballot a letter giving reasons for so voting. This information will be of great assistance to the Committee in a further study of the subject.

Your reply, addressed to the Secretary of the Mechanical Division, Association of American Railroads, 20 East Van Buren Street, Chicago, Illinois, submitting your ballot, is requested.

Respectfully,
Paul Peterson
Secretary

A.A.R. Official!

A.A.R. Letter Ballot circular D.V. 1348 defines loose waste

A.A.R. Board of Directors
this problem
the following resolution at meeting held in November, 1955:

RESOLVED, That the General Committee, Mechanical Division, be requested to expedite the adoption of controlled clearance bearing; elimination of loose waste; and continue its work toward other suggestions and recommendations that will improve the performance of solid bearings.

"RESOLVED FURTHER, That the Board recommends the

4

Association of American Railroads

So as to clarify the intent of the term "loose journal box packing" as used above, the following will govern:

Considered Loose Journal Box Packing.

- (1) Mass waste packing in boxes with or without wire retainers.
- (2) Mass waste packing in boxes with integral or bolted on journal stops.
- (3) Hand or machine made roll packing as in (1) and (2) above.

Not Considered Loose Journal Box Packing.

- (A) Waste used in pads where thread ends are secured by stitching or plastic attachment to pad.
- (B) Mass waste packing used in containers such as Plypak.

Rather than instruct the individual committees of the Division to first prepare definite recommendations covering changes and additions in the mandatory rules incident to the adoption of this proposed change in lubrication practice and submit such changes with this letter ballot, the General Committee

for Proven Protection

Specify

PLYPAK

WASTE CONTAINER AND RETAINER

WAUGH EQUIPMENT COMPANY, New York • Chicago • St. Louis • Canadian Waugh Equipment Company, Montreal

For MODERN PASSENGER CARS:



New Southern Pacific Dome Lounge cars make use of Met-L-Wood in modern interiors.

Original Beauty
in Panels
Partitions
Wainscoating
Doors

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Your designers have a wide choice of beautiful modern passenger car interiors when Met-L-Wood is the building material . . . Smooth, tough panels and doors, finished in steel, stainless, aluminum, Formica or Decorative Vinyls permit original beauty of design, plus these *practical* operating advantages of Met-L-Wood:

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Met-L-Wood is the exclusive distributor of Formica products in the transportation industry. Now, you can use the many distinctive Formica designs—and excellent wearing qualities—bonded to Met-L-Wood panels and doors for unsurpassed beauty and utility in passenger car interiors. Full details on Formica-faced Met-L-Wood will be sent promptly on request . . . and don't forget Formica superiority for table, counter and washstand tops!

ANOTHER

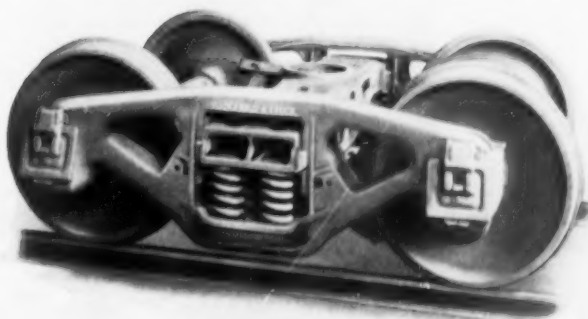
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EXTRA



..AT NO EXTRA COST!

**ACCURATE UNIPLANE* JIG GRINDING
OF JOURNAL BOX LID FACE IMPROVES CLOSURE**



* First featured on Buckeye's
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now standard process on all Buckeye
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... guards perishables under ALL conditions!

Major refrigerator car builders have been using all-hair insulation for nearly half a century — and today they specify Streamlite HAIRINSUL because of its 40% less weight, higher efficiency and greater economy.

At any location, at any temperature Streamlite HAIRINSUL provides maximum protection to valuable shipments of perishables.

Yes, Streamlite HAIRINSUL assures you all the major advantages listed at the right — and more besides. Write for complete data.

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- **LOW CONDUCTIVITY** — Thoroughly washed and sterilized, all-hair heat barrier. Rated conductivity — .25 btu per square foot, per hour, per degree F., per inch thick.
- **LIGHT WEIGHT** — Advanced processing methods reduce weight of STREAMLITE HAIRINSUL by 40%.
- **PERMANENT** — Does not disintegrate when wet, resists absorption. Will not shake down, is fire resistant and odorless.
- **EASY TO INSTALL** — Blankets may be applied to car wall in one piece, from sill to plate and from one side door to the other. Self-supporting in wall section between fasteners.
- **COMPLETE RANGE** — STREAMLITE HAIRINSUL is available ½" to 4" thick, up to 127" wide. Stitched on 5" or 10" centers between two layers of reinforced asphalt laminated paper. Other weights and facings are available.
- **HIGH SALVAGE VALUE** — The all-hair content does not deteriorate with age; therefore has high salvage value. No other type of insulation offers a comparable saving.



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He makes your problems his career...

He's equally at home in your car shops . . . engineering department . . . executive offices. He's factual and well-informed—your National representative.

Most important of all, he's backed by a *complete organization* . . . an organization with 89 years' experience in solving your type of problem . . . an organization young in spirit, with the enthusiasm to

turn today's problems into tomorrow's commonplace.

Add to all this . . . National's Technical Center, one of the most extensive testing and development laboratories of its kind in the world . . . and National's peerless production facilities.

Perhaps we *should* say—NATIONAL makes your problems its career.

AA-3106

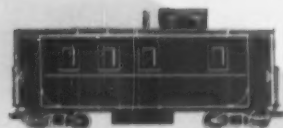
NATIONAL MALLEABLE and STEEL CASTINGS COMPANY

Cleveland 6, Ohio

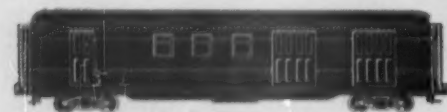
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The only $\frac{1}{2}$ to 5 KW
Positive Gear Railway
Generator Drive
 on the market

... now makes
 possible **New efficiencies,**
New economies, New conveniences
 for **ALL railroads**



TWO-WAY RADIO



LIGHTING
EQUIPMENT



REFRIGERATION

The new, small $\frac{1}{2}$ to 5 KW Spicer **Positive Gear** Generator Drive makes available to caboose, baggage, refrigerator, and mail cars, all the advantages of steady, ample electrical current.

And the new Spicer Drive delivers the power for this $\frac{1}{2}$ to 5 KW current with all the standards of efficiency and dependability established by the large, time-proved Spicer **Positive Gear** Generator Drive. More than 11,000 large Spicer Drives are now in use on over 70 railroads all over the world.

The Spicer Railway Generator Drive for radio, lighting, refrigeration and other electrical equipment consists of a very simple application of quiet, long-lived spiral bevel gear and pinion mounted at the end of a standard axle, thereby permitting rapid inspection and maintenance. The drive from the gears is positive and constant through Spicer Universal Joints and Propeller Shaft to the Spicer Safety Clutch which is attached to the generator. This safety clutch absorbs heavy shock loads and disconnects the drive line in case of an excessive overload, thus protecting the generator from damage.

Spicer Positive Railway Generator Drives can be quickly and economically adapted to new car designs and reconditioning jobs. Write for further details.

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**STRONGER SILLS FOR
WIDER DOORS**

M·F

Threshold Plates

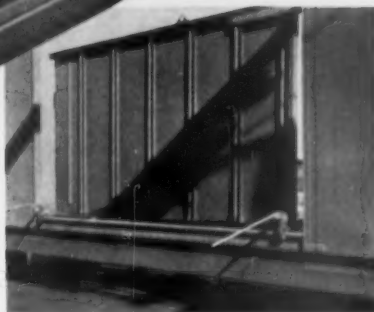
are permanently welded structural members of the car . . . they provide more rigid openings — more necessary than ever with wider doors!

Floor boards don't pass under the 'M-F' Threshold Plate — worn or broken floor boards are more easily and more quickly replaced . . .

MAC LEAN-FOGG

Lock Nut Company

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AND with the 'M-F' Threshold Plate uniform length floor boards may be used throughout the car.

why most R. R. men look



OAKITE gives you the IMPORTANT advantage

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When railroad men tell us "nothing does the job as good as Oakite," they're saying, in effect, that Oakite Materials are the standard for comparing *cleaning efficiency*. We've heard such comments again and again... deserved for the best of reasons:

KEYED TO RAILROAD NEEDS

Especially formulated for railroads, Oakite materials offer the best possible answers for such jobs as car washing, truck and under-carriage cleaning, parts cleaning for overhaul or inspection, and many more. Each Oakite compound contains a proper balance of *all* needed ingredients, nothing less. No cutting corners on quality. That's why men who've seen Oakite materials in action know that better results can't be had.

RESEARCH FOR RAILROADS

Oakite has pioneered almost every modern mechanical cleaning development to replace

outmoded costly manual methods. This was achieved not by imitation of others but by painstaking research in modern Oakite laboratories and by working side by side with railroad personnel. Constant improvement is a continuous program at Oakite.

CUSTOMER AID

The Oakite facilities, experience and engineering know-how are always available to railroad men. Many times blueprints are furnished for cleaning equipment easily made in your own shops. What happens when a cleaning problem's new to both of us? Oakite sticks with it until it's solved.

ILLUSTRATED BOOKLET AVAILABLE

The full story on Oakite's contribution to lower cost, speedier cleaning in railroading is detailed in Booklet No. F8055. Write Oakite Products, Inc., 46 Rector Street, New York 6, New York.

RAILROAD DIVISION

... LOW-COST END RESULTS

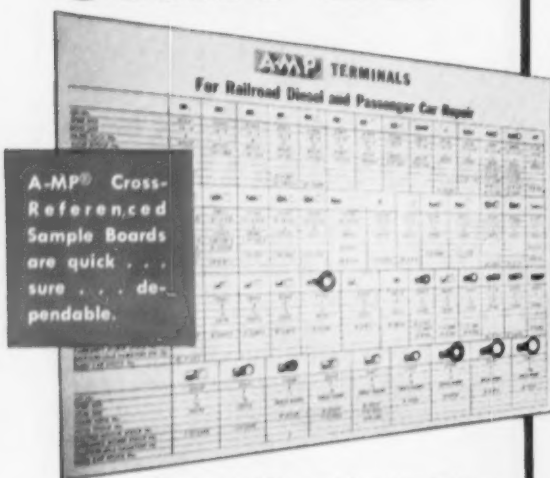


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making the

COMPLEX SIMPLE



The handy API terminal guide eliminates errors in applications. One quick glance shows you the O.E.M. part number, the railroad part number, the correct tooling required and the API part number.

Make sure the latest edition of the A-MP Sample Board is displayed in all Diesel passenger-car and electrical repair shops.

API branch warehouses stock all popular A-MP terminals and tools for railroad maintenance and repair. Contact your local API office.



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Trade Mark

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Midwest railroad* installs Air-Maze Oil Bath Air Filters— power assemblies still going strong 33 months later

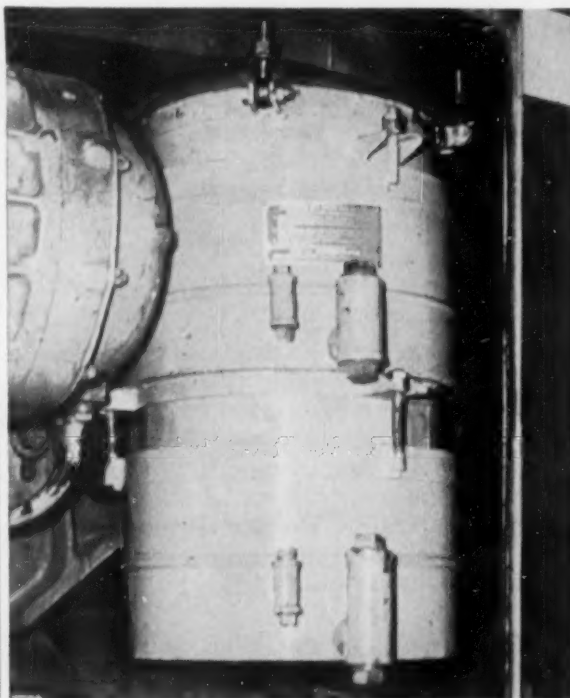
Compare The Wear

Before With Panel-Type Filters

after 9 months...
Excessive ring wear required
complete power assembly change-
out on new 1200 HP Switcher.

Now With AIR-MAZE Oil Bath Air Filters

after 17 months inspection of
one power assembly revealed...
• Ferrox Indicating Grooves
visible over entire compres-
sion-ring periphery
• Liner wear only .001" (2"
from top)
• Top compression ring gap in-
crease only .025"
• Hone marks clearly visible
on liner surfaces and—remain-
ing 11 power assemblies still
in operation 33 months later.



Photograph shows type of Air-Maze oil bath filter used on this diesel engine

Air-Maze oil bath filters can double, often triple power assembly life because they keep intake air clean. And they go longer without servicing—cut downtime, lower engine maintenance costs. For

more information call on us. The Air-Maze Corp., 25000 Miles Ave., Cleveland 28, O.

There's an Air-Maze oil bath filter for most locomotives in service today.

*Name on request.

AIR-MAZE
The Filter Engineers

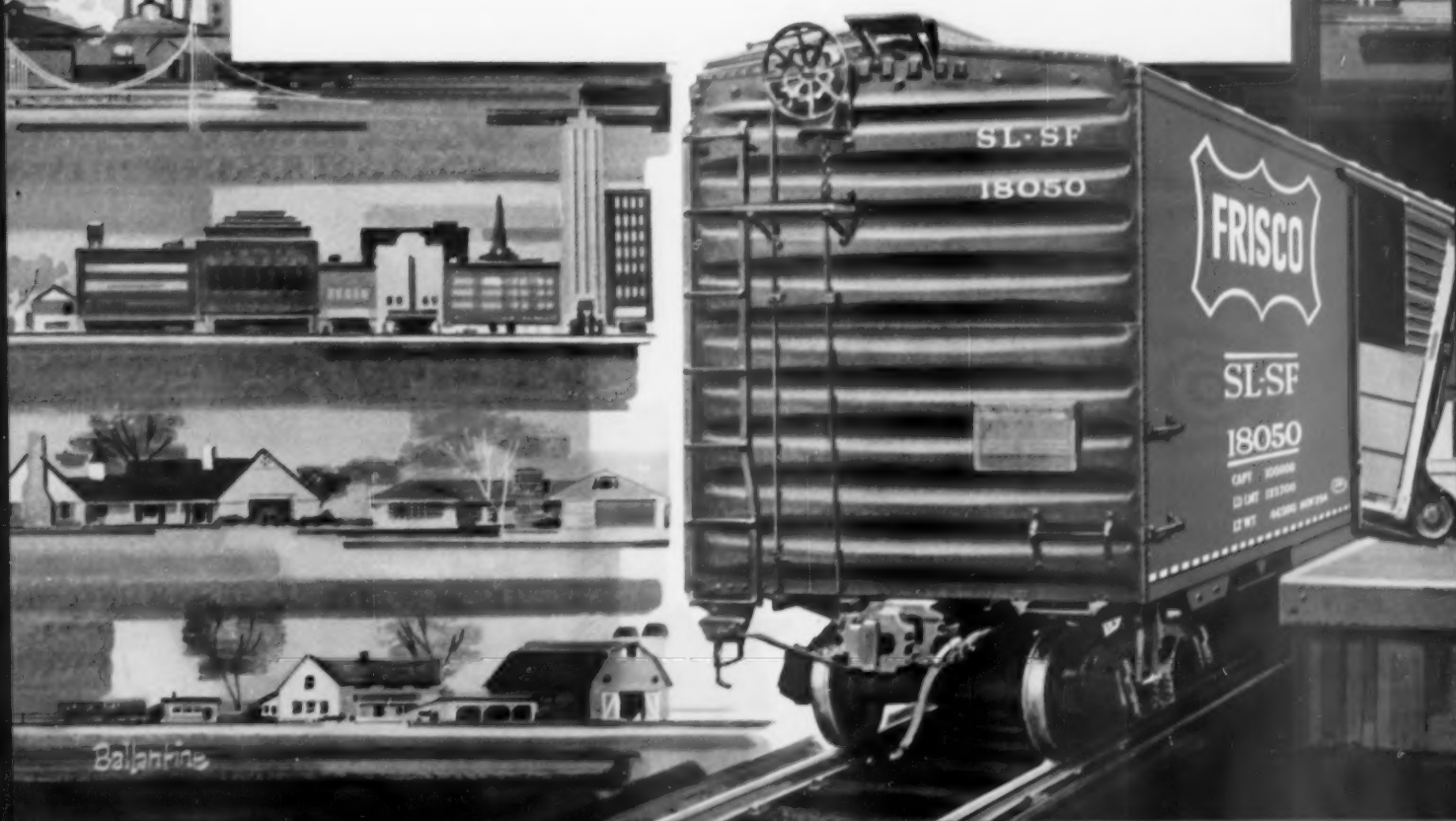
AIR FILTERS • SILENCERS • SPARK ARRESTERS
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workhorses on wheels

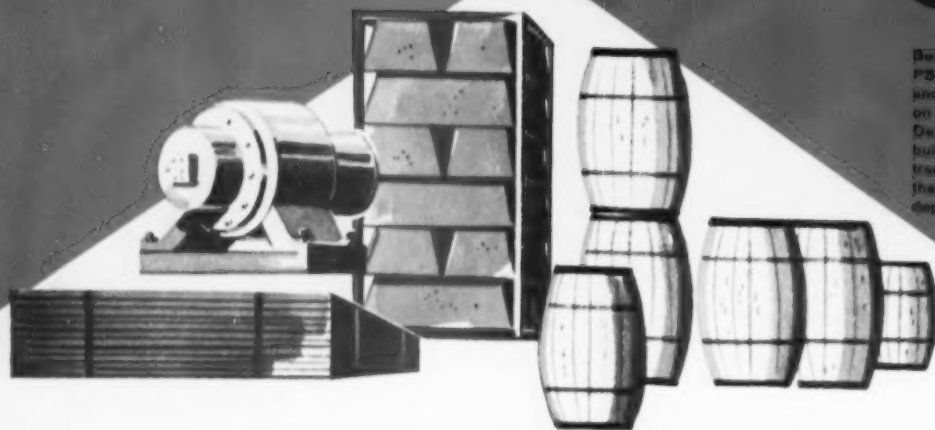
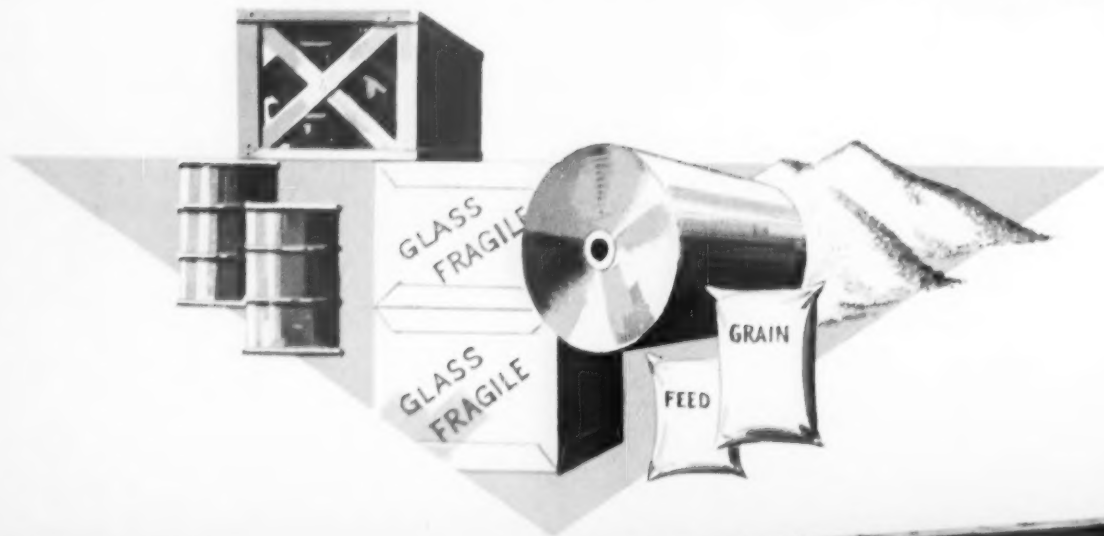
FRISCO *the St. Louis-San Francisco Railway is
well served by PS-1 Standardized Box Cars*

In its slogan "Ship It On The Frisco!" the St. Louis-San Francisco Railway does not limit or qualify the transportation job it is willing to do . . . and is doing every day. This important railroad is a major user of PS-1 Standardized Box Cars. It relies on dependable PS-1 workhorses for the kind of rolling stock performance and versatility that makes its slogan meaningful to Frisco shippers and consignees. Frisco box car No. 18050 was selected as typical of the PS-1 Standardized Box Cars in the Frisco fleet. It is also representative of the 72,768 PS-1s that 73 other service-conscious railroads have put to work.

The movement record of Frisco PS-1 No. 18050 which appears in these pages demonstrates the scope of its on-line and interchange travels during the first year of its life. Since Frisco 18050 was used in general service it experienced all the lading and operational conditions to which box cars are subjected. The high level of its performance and dependability is confirmed by the fact that since No. 18050 the Frisco has ordered 1700 more PS-1 Box Cars.



the FRISCO's PS-1s...



Box Car No. 18050 is typical of the 3000 PS-1s the Frisco has in service or on order ... and of the more than 72,000 PS-1s owned or by 73 other shipper conscious railroads. Designed, engineered, tested, and built to handle the entire range of loading traditionally entrusted to box cars, PS-1s help the Frisco maintain its reputation for dependability among shippers and consignees.

*hardworking,
dependable,*

STANDARDIZED

FRISCO PS-1 No. 18050 movement record... first year of service

FROM	TO/AT	DATE
1954		
P-S Bessemer Shops	Bessemer, Ala.	Feb. 8
Bessemer, Ala.	Pratt City, Ala.	8
Pratt City, Ala.	Yale, Tenn.	8
Yale, Tenn.	Chaffee, Mo.	12
Chaffee, Mo.	St. Louis Yd., Mo.	12
St. Louis, Mo.	Missouri Pacific	13
Missouri Pacific	Alton & Southern	13
Alton & Southern	New York Central	14
New York Central	Nickel Plate	15
Nickel Plate	Chesapeake & Ohio	16
Chesapeake & Ohio	New York Central	17
New York Central	Boston & Maine	Mar. 17
Boston & Maine	Delaware & Hudson	18
Delaware & Hudson	Lahigh Valley	Apr. 1
Lahigh Valley	Chesapeake & Ohio	3
Chesapeake & Ohio	Chicago & Eastern Illinois	4
Chicago & Eastern Illinois	Missouri Pacific	7
Missouri Pacific	St. Louis Yd., Mo.	10
St. Louis Yd., Mo.	Crystal City, Mo.	14
Crystal City, Mo.	St. Genevieve, Mo.	15
St. Genevieve, Mo.	Cape Girardeau, Mo.	16
Cape Girardeau, Mo.	Chaffee, Mo.	20
Chaffee, Mo.	St. Louis Yd., Mo.	20
St. Louis Yd., Mo.	Missouri Pacific	21
Missouri Pacific	Manufacturers Ry.	22
Manufacturers Ry.	Missouri Pacific	26
Missouri Pacific	Santa Fe	30
Santa Fe	Union Pacific	May 8
Union Pacific	Wabash	8
Wabash	Chesapeake & Ohio	4
Chesapeake & Ohio	Belt Railway of Chicago	12
Belt Railway of Chicago	Chicago & North Western	16
Chicago & North Western	Union Pacific	28
Union Pacific	Rock Island	June 4
Rock Island	Fort Dodge, Des Moines & Southern	10
Fort Dodge, Des Moines & Southern	Milwaukee Road	12
Milwaukee Road	Chicago, North Shore & Milwaukee	28
Chicago, North Shore & Milwaukee	Elgin, Joliet & Eastern	29
Elgin, Joliet & Eastern	Baltimore & Ohio	29
Baltimore & Ohio	Southern	July 3
Southern	Manon	13
Manon	Belt Railway of Chicago	14
Belt Railway of Chicago	Soo Line	14
Soo Line	Milwaukee Road	21
Milwaukee Road	Indiana Harbor Belt	23
Indiana Harbor Belt	Nickel Plate	23
Nickel Plate	Delaware, Lackawanna & Western	24
Delaware, Lackawanna & Western	Delaware & Hudson	Aug. 12
Delaware & Hudson	Boston & Maine	13
Boston & Maine	New Haven	19
New Haven	Lahigh & Hudson River	22
Lahigh & Hudson River	Delaware, Lackawanna & Western	22
Delaware, Lackawanna & Western	Nickel Plate	23
Nickel Plate	Gulf, Mobile & Ohio	24
Gulf, Mobile & Ohio	Santa Fe	Sept. 8
Santa Fe	Texas & Pacific	28
Texas & Pacific	Missouri-Kansas-Texas	29
Missouri-Kansas-Texas	St. Louis-Southwestern	Oct. 7
St. Louis-Southwestern	Louisiana & Arkansas	9
Louisiana & Arkansas	New Orleans Public Belt	10
New Orleans Public Belt	Southern	10
Southern	Texas & New Orleans	23
Texas & New Orleans	International-Great Northern	Nov. 5
International-Great Northern	St. Louis, Brownsville & Mexico	13
St. Louis, Brownsville & Mexico	International-Great Northern	20
International-Great Northern	St. Louis, Brownsville & Mexico	30
St. Louis, Brownsville & Mexico	Texas & New Orleans	Dec. 2
Texas & New Orleans	Missouri-Kansas-Texas	4
Missouri-Kansas-Texas	International-Great Northern	10
International-Great Northern	St. Louis-Southwestern	21
1955		
St. Louis-Southwestern	Illinois Central	Jan. 3
Illinois Central	Missouri Pacific	3
Missouri Pacific	Memphis, Tenn.	5
Memphis, Tenn.	Birmingham, Ala.	6
Birmingham, Ala.	Central of Georgia	7
Central of Georgia	Seaboard Air Line	20
Seaboard Air Line	Gulf, Mobile & Ohio	Feb. 3
Gulf, Mobile & Ohio	Terminal R.R. Assoc. of St. Louis	7
Terminal R.R. Assoc. of St. Louis	St. Louis, Mo.	9
St. Louis, Mo.	Springfield, Mo.	9
Springfield, Mo.	Kansas City, Mo.	9
Kansas City, Mo.	Union Pacific	10

Among the earliest buyers of PS-1s, the shipper-conscious St. Louis-San Francisco Railway Company, the famed Frisco, has demonstrated its belief in the value of standardization by a long record of repeat orders for these cars.

During the ten years since the introduction of the PS-1 Standardized Box Car, the first pre-engineered, laboratory-proved and mass-produced freight car, the Frisco has purchased 3500 of these units on 10 separate occasions.

In its unrelenting efforts to provide even higher standards of railroading for the shippers and consignees along its 5,000 track miles, the Frisco relies heavily on equipment such as the PS-1 to keep costs and maintenance down, service and shipper acceptance high. The Frisco's PS-1s serve as real workhorses by meeting the challenges of weather extremes and diverse operating requirements, while carrying an infinite variety of lading.

For example, Frisco shippers and consignees include leaders in the pulp and paper, milling and glass industries to name only a few which require skillful lading handling.

Pullman-Standard has traditionally worked closely with such progressive roads as the Frisco to make certain that PS-1 Box Cars meet the needs of both railroads and shippers. And such railroad-carbuilder liaison has pointed the way toward many PS-1 improvements.

While the PS-1 is truly a standardized freight car, its carefully planned-for design flexibility has permitted inclusion of new ideas and techniques to keep pace with advancing railroad operations.

Pullman-Standard Field Service Engineers, making hundreds of critical in-service inspections each year, report on the performance of each lot of PS-1s in service. Outstanding durability features as well as areas for improvement are reported for consideration in future designs. This means that the PS-1 and other P-S Standardized Freight Cars, will continue to fill the rolling stock requirements of the progress-making railroad industry.

In addition to the PS-1 Box Car, Pullman-Standard's line of standardized freight cars includes the PS-2 Covered Hopper, PS-3 Open Top Hopper and the new PS-4 all-purpose Flat Car. Each of these cars offers railroad users the full benefits of mass-production and standardization that have prompted the railroads to specify the PS-1 as one out of every four box cars built in the last ten years.

Neither Frisco 18050's travels nor its ability to handle lading are unusual... being merely all in a year's work for it or any PS-1. The economical, dependable every-year-all-year performance every PS-1 turns in is the direct result of the applied carbuilding know-how of the designers, engineers, laboratory scientists, production experts, craftsmen and field service engineers dedicated to keeping Pullman-Standard the world's largest carbuilder.



WORLD'S LARGEST MANUFACTURER OF PASSENGER AND FREIGHT CARS

PULLMAN-STANDARD

CAR MANUFACTURING COMPANY

SUBSIDIARY OF PULLMAN INCORPORATED

221 NORTH LA SALLE STREET, CHICAGO 1, ILLINOIS
BIRMINGHAM, PITTSBURGH, NEW YORK, SAN FRANCISCO, WASHINGTON

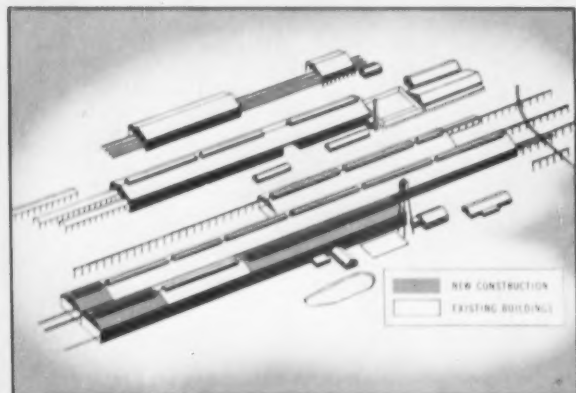
how the FRISCO's PS-1s were built



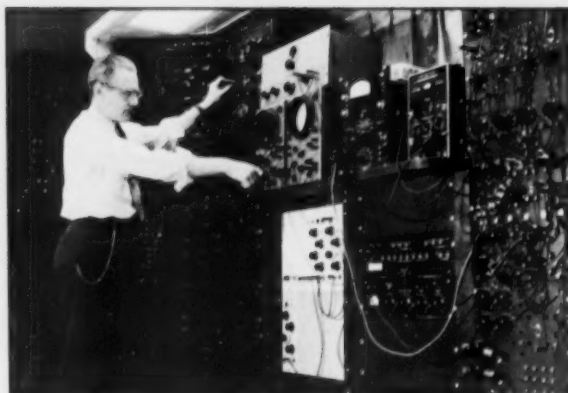
Long runs of alike freight cars, possible only through standardization, enable buyers to receive full benefit of precise and economical mass production using advanced techniques, costly dies, jigs and fixtures impractical for limited runs of custom cars. Pictured is an underframe welding positioner that insures down-hand welding precision.



Since the first PS-1 was delivered, over 150 engineering, structural, and production improvements have been made in standardized designs to keep pace with advancing railroad operating conditions. Trained P-S Field Service Engineers, making hundreds of in-service inspections each year, initiated many of these advances through factual reporting of car performance.

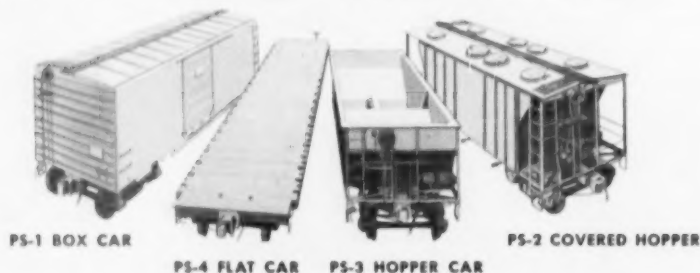


Pullman-Standard operates freight car plants at Hammond, Ind., Michigan City, Ind., Butler, Pa., and Bessemer, Alabama. Strategically located, these plants are constantly undergoing physical improvement for more economical and efficient production. The Bessemer Plant, above, is starting a multi-million dollar expansion program to give the railroads even better service.



With the largest Research and Development facility in the carbuilding industry Pullman-Standard tests products, materials and processes. Advanced scientific instruments and techniques prove standardized freight car designs before they are put into service. Pictured is an Analog Computer used for complex analytical calculations.

Built to serve best on the
GREAT AMERICAN RAILWAY SYSTEM



WORLD'S LARGEST MANUFACTURER OF PASSENGER AND FREIGHT CARS

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CAR MANUFACTURING COMPANY

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CHLOROTHENE cleans diesel locomotive armatures, electrical cabinets, generators, traction motors and many other parts.

Vital diesel units get more effective, faster, safer cleaning when you're using CHLOROTHENE

The dramatically effective *safety solvent*, CHLOROTHENE* (Dow 1, 1, 1-Trichloroethane, Inhibited), pops up in more and more Motive Power Departments. Pains-taking research and extensive use show that CHLOROTHENE is the *ideal cold solvent* for quick, thorough cleaning of railway electrical equipment. Its adaptability to use for bucket, dip, wipe or spray application assures the complete cleaning action so necessary to proper functioning of irregularly shaped, recessed wiring, for example.

While no drastic modification of your present regulations and practices is suggested, CHLOROTHENE almost certainly is a *safer* solvent than any other you might now be using. It has *low toxicity*, with an M.A.C. rating of 500 ppm. . . . 2½ times greater than that of trichloroethylene, 20 times greater than carbon tetrachloride's. CHLOROTHENE also lessens fire hazard; it has *no flash or fire point* as measured by the Cleveland Open Cup Method.

Very high solvent power, greater safety . . . and CHLOROTHENE gives extremely *low corrosive effects* with all common metals. Your

Dow distributor . . . *exclusively* . . . can supply you with CHLOROTHENE right now. For detailed information, please return coupon to THE DOW CHEMICAL COMPANY, Midland, Michigan.

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Send me technical information on CHLOROTHENE.

I'm interested in how well it cleans _____

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you can depend on DOW SOLVENTS



7 G-E replacement parts for better locomotive operation...

1. G-E CONTACT PARTS get final check with "go-no-go guage" to assure perfect fit. Tips are carefully checked because improper fit causes burning and damage to other parts of your contactors.



How General Electric Contacts Are Built to Cut Road Delays

When you buy contacts for the control system of your locomotives, you should also be buying *fewer road delays*. That's why your best buy in contact parts is G.E.

These General Electric renewal parts will give you the peak performance you want for two important reasons:

1. They are built of the same high-grade materials as those used in the original equipment. Result is positive electrical contact,

minimum mechanical wear, *fewer road delays*.

2. They are built to the same dimensions as the original equipment so you get proper fit without filing. Result is proper alignment, which eliminates excessive heat on contact surfaces, a major cause of road delays.

To get the performance you originally bought, always specify genuine G-E contacts. Locomotive & Car Equipment Dept., General Electric Co., Erie, Pa.

128-27

Progress Is Our Most Important Product

GENERAL  ELECTRIC

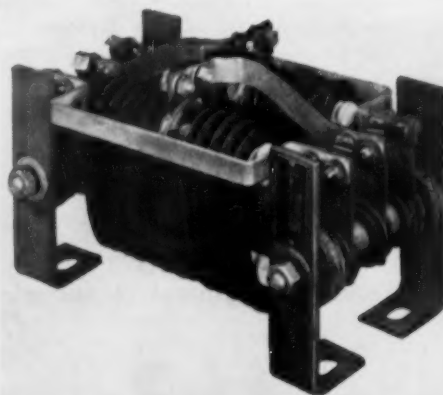
2. G-E RECOMMENDED CARBON BRUSHES are selected for the proper degree of hardness and grain structure to minimize wear and tear on commutator surfaces of your unit.



3. G-E GEARING is designed and quality-control manufactured to carry the heavy starting loads and take the running shock loads encountered in today's heavy railroad service.



4. G-E RESISTORS have floating steel backbones that expand and contract freely with high temperature changes and therefore are not subject to harmful buckling forces.





ON THE TESTING LINE—COMPLETED CONTACTS UNDERGO RIGID INSPECTION TO ASSURE YOU OF TOP LOCOMOTIVE PERFORMANCE.

5. G-E COMMUTATORS retain smoothness in rigorous service because high-speed, high-temperature seasoning process sets segments firmly in place, cuts down friction wear and tear.

6. G-E ARMATURE COILS are available as part of complete rewind kits for your convenience. Every coil is dimensionally accurate and quality insulated for longer life.

7. G-E MOTOR SUSPENSION BEARINGS give you longer service life—have a built-in oil-return feature which can save up to \$85.00 of operating costs per locomotive unit each year.





Here's long brush life on the long hauls

The Speer #6758 MULTIFLEX® Brush is serviced-designed for outstanding performance in high hp locomotives — both freight and passenger.

Its special, patented MULTIFLEX construction gives all the advantages of a double brush — yet it operates in a single holder. Two independent sections minimize uneven wear and reduce vibration, assuring long service life and less wear on commutators.

Another Speer exclusive feature is the vibration-proof shunt connection. It's strongly and permanently imbedded in this brush with Speer's patented tamping compound.

Like all Speer brushes, every detail of the #6758 was designed for its particular job. It was tested, evaluated and modified to serve heavy-duty motive units at top efficiency.

That kind of practical design makes a Speer brush the right choice for every kind of locomotive. You name your equipment — and Speer will show you high-performance brushes made specifically for your type operation.

*Write for your free copy of
the new Speer Brush Catalog.*



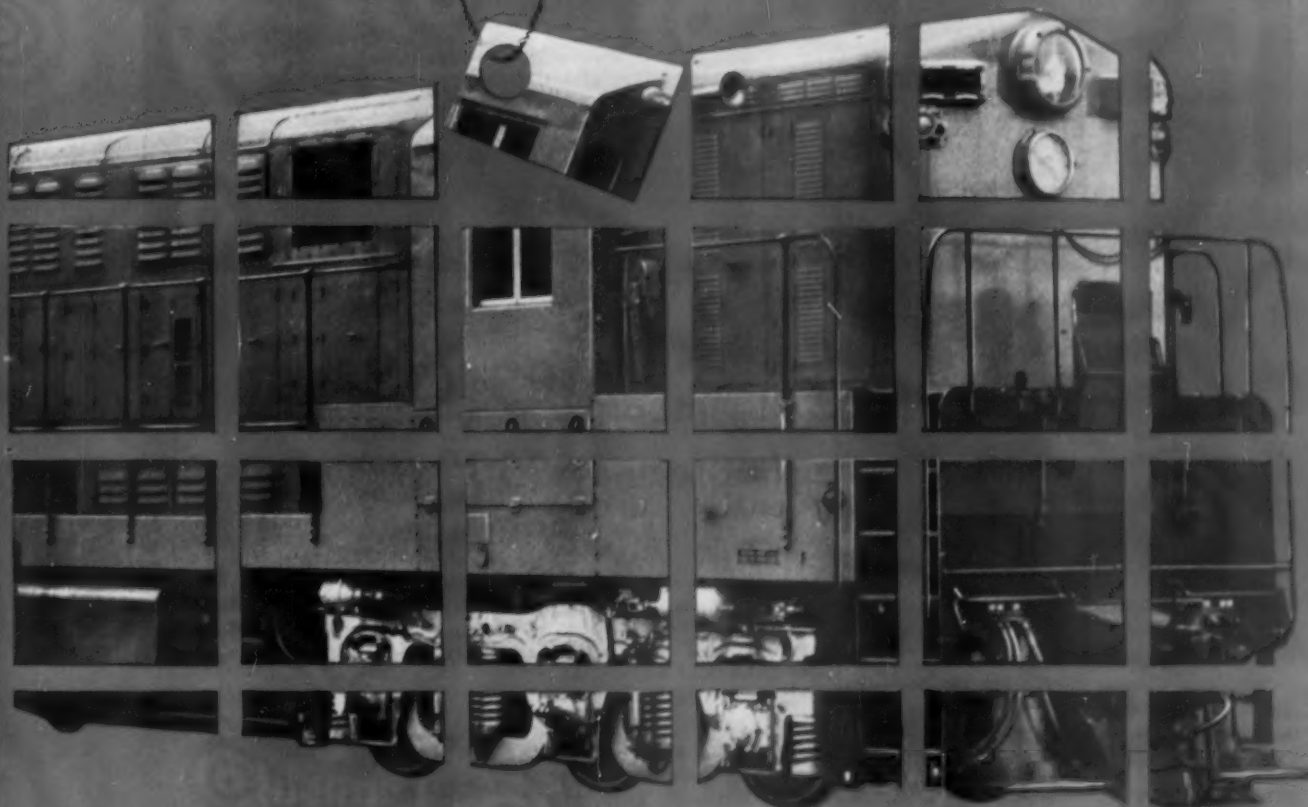
SPEER Carbon Co.
St. Marys, Pa.

new parts order

Only by ordering genuine Fairbanks-Morse replacement parts can you be sure of getting the improved performance that results from continuing F-M product research—part by part.

Each Fairbanks-Morse part has been engineered to integrate perfectly with all other components to assure longer parts life—and better over-all locomotive performance.

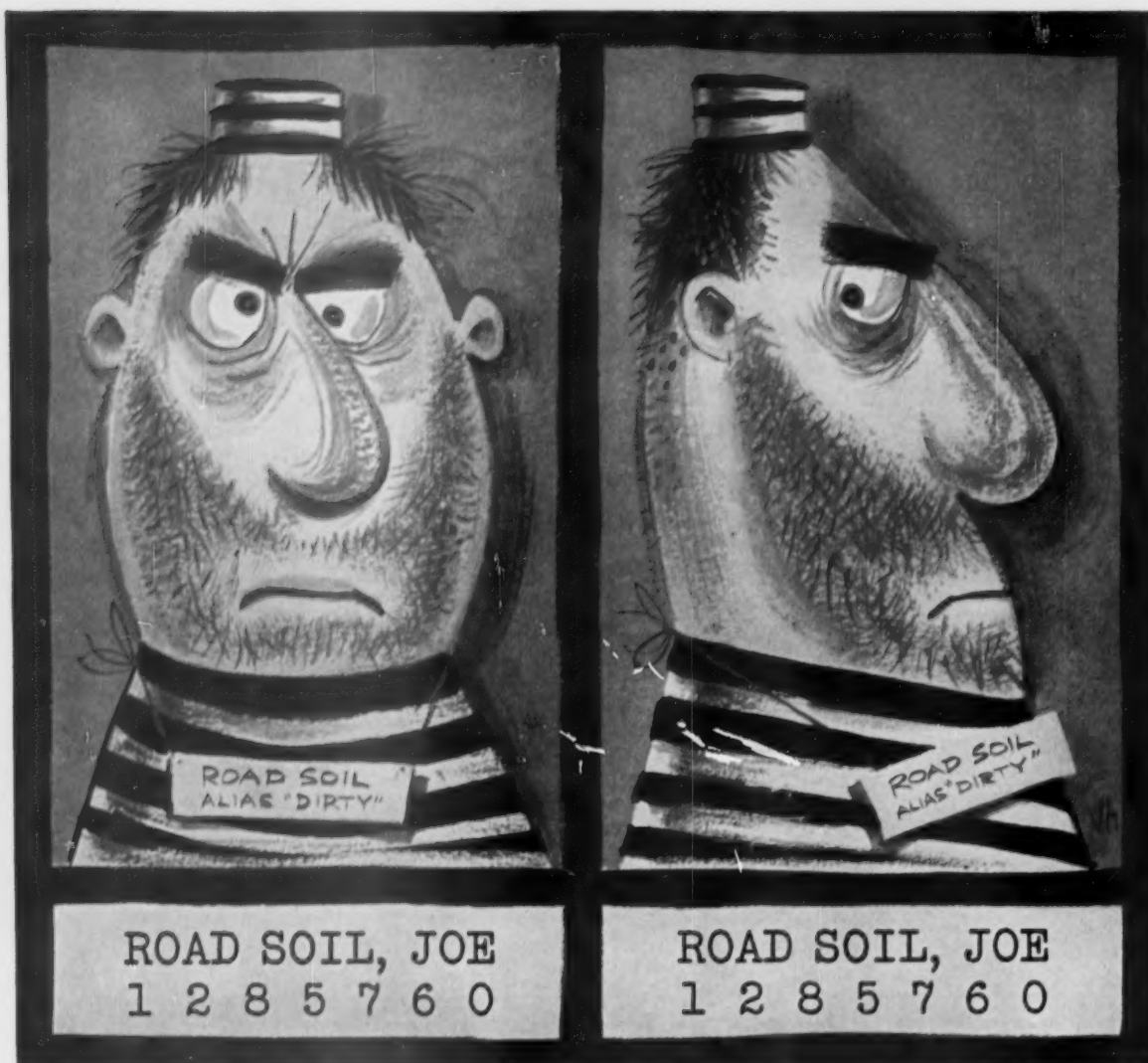
Be sure you get this Dividend of Quality. Specify genuine F-M engineered parts that are designed to give superior performance in Fairbanks-Morse locomotives. Fairbanks, Morse & Co., 600 So. Michigan Avenue, Chicago 5, Ill.



FAIRBANKS-MORSE

a name worth remembering when you want the BEST

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Crusty running gear COMES CLEAN in Pennsalt Cleaner "50"

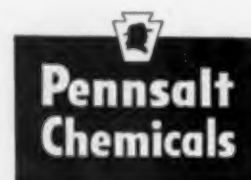
That old hardened criminal, Road Soil, breaks down fast under the penetrating attack of new Pennsalt Cleaner "50". Trucks, running gear, wheels, fuel tanks—everything under a diesel from the underframes to the rails—comes cleaner than ever before with the simple application of this easy new cleaner.

HOW TO USE Pennsalt Cleaner "50"?
Make up a stock solution in the reserve tank of your pressure spray unit. Shoot Pennsalt Cleaner "50" on running gear

and undercarriage with steam or spray gun, and Road Soil—no matter how corrupt—wilts fast.

TRY PENNSALT CLEANER "50", the balanced alkaline detergent made to beat toughest cleaning problems on grimeiest diesel running gear. For more information call the Pennsalt man now, or write Metal Processing Dept. 297, Pennsylvania Salt Manufacturing Co., East: Three Penn Center Plaza, Philadelphia 2, Pennsylvania.

West: Woolsey Bldg., 2168 Shattuck Ave., Berkeley 4, Calif. In Canada: Pennsalt Chemicals of Canada, Hamilton, Ontario.





For Records of Wheel Service **LOOK UNDER YOUR CARS**

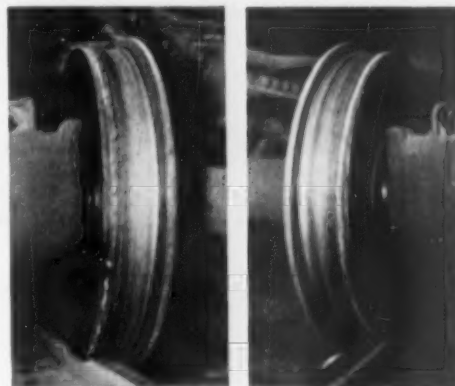
Years of safe, dependable service bear witness to the mile-for-mile economy of Armco One-Wear Wrought Steel Wheels. See for yourself. *Just look under your cars.*

Only forged and rolled wheels have the wear resistance and toughness to deliver so many miles per dollar. They give you these advantages:

- greater safety
- long service life
- permit faster freight
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What's more, slid-flats in Armco One-Wear Wrought Steel Wheels don't automatically mean discards. More often than not they can be machined and returned to service.

If you'd like full information about economical Armco Wrought Steel Wheels, just call our nearest sales office or write us at the address below.



Stamped on the back of the rim of each Armco One-Wear Wrought Steel Wheel is the year it was made. Inspection of tread contours shows that this pair of one-wear wrought steel wheels, made in 1928, should deliver many more years of safe service.

ARMCO STEEL CORPORATION

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New luxury coaches, such as this gleaming stainless steel car, have been added to popular trains on the Missouri-Kansas-Texas and the St. Louis-San Francisco Railroads. The cars are constructed of chromium-nickel stainless framing members in sides, ends and roof. They employ stainless steel

for outer sheathing, supporting channels, roof hoods, safety appliances, side and end sills, buffer wings, sub-floor sheets and stringers. The interiors, including galleys, use stainless widely, for durability, beauty and hygienic cleanliness. The builder: Pullman-Standard Car Mfg. Co., Chicago 3, Ill.

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Cars of this type, made entirely of chromium-nickel stainless steel except for the center sill, cross-bearers, bolsters and floor beams, hold down operating and maintenance costs.

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Corrosion - resisting all the way through, the chromium-nickel alloy steel retains its original section thickness indefinitely. There's no need for paint or protective coatings to help it resist corrosive attacks. Easy to clean and keep clean, stainless steel stays attractive in appearance year after year.

Answers many demands

Today, hardly a passenger car is

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An illustrated copy of "*Nickel Alloys in Railroad Equipment*," is yours for the asking. Send for this 32-page booklet that shows the wide use of nickel alloy steels and other alloys of nickel in rolling stock, motive power and even in track work. Write for it now.

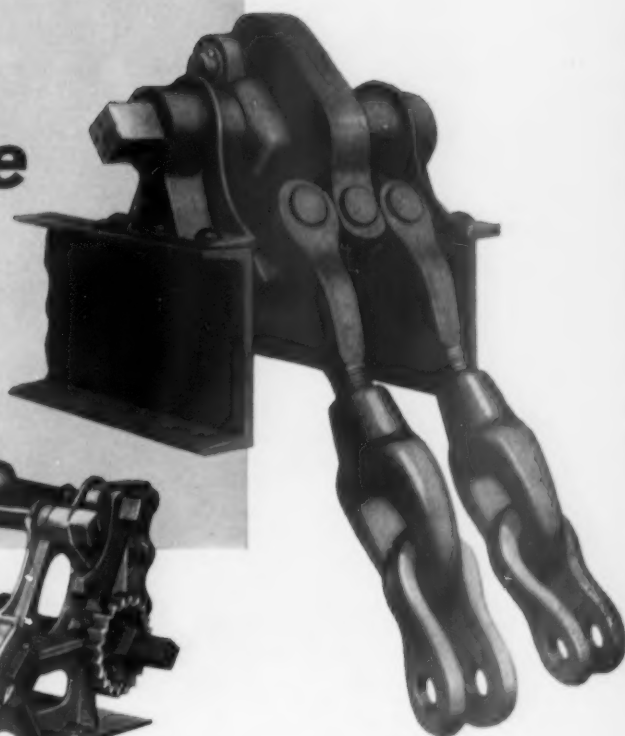


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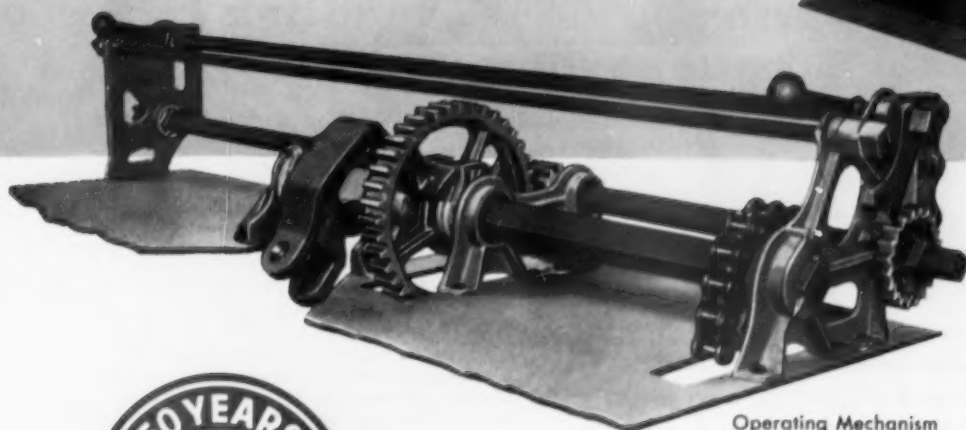


ENTERPRISE

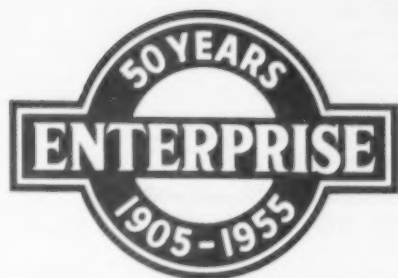
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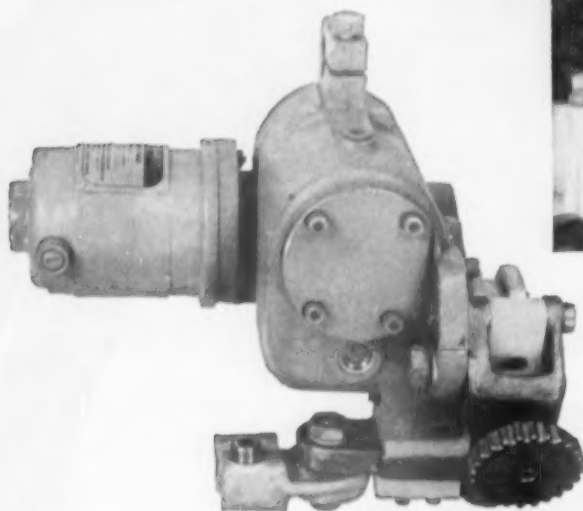
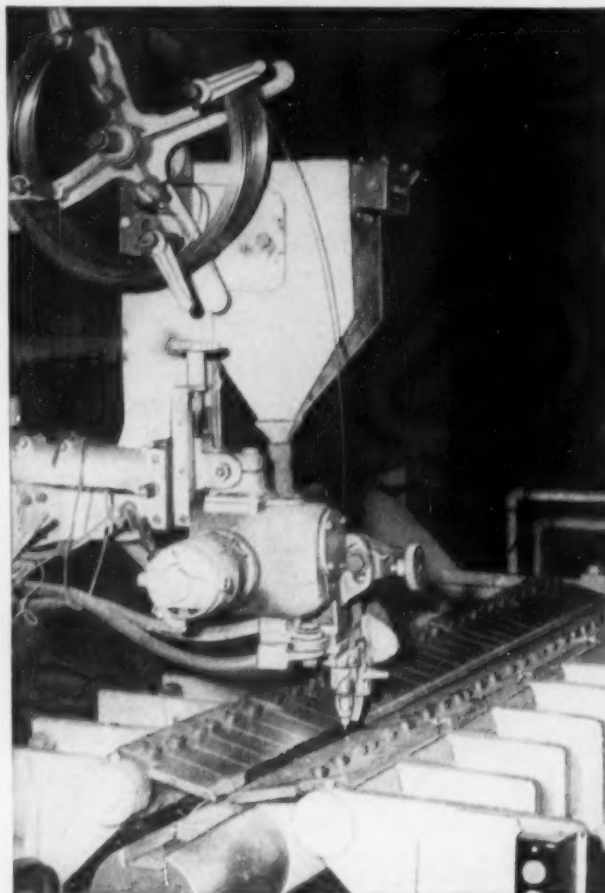
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... cooperating with a railroad in solving a problem.

a diesel locomotive... a technical representative...and a team

The man boarding the diesel is a Du Pont technical representative... a chemist by training and experience. His services are available to help railroads solve fuel oil problems, and in this respect he's typical of others in Du Pont's Petroleum Chemicals Division.

These technical representatives are experienced in trouble-shooting. Many times they have licked problems involving fuel for locomotive diesels. Two Du Pont products have proved of especial value in fuel improvement:

Fuel Oil Additive No. 2 is an inhibitor and dispersant with rust-preventive properties. It is an indirect result of Du Pont's discovery of nylon, when the first synthesis of this type of long-

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A Petroleum Chemicals Division representative will gladly assist rail-

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The variety of uses to which road switcher locomotives are put — high-speed level runs, pusher service on steep grades, light-loading in yard-service — demands the utmost in versatility of a brush grade. There are good reasons why "National" brushes are best in this service...and why far more of them are used than all other makes combined!

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EDITORIALS

One Way To Get Good Men

A news release from the Delaware & Hudson announces a policy whereby the company will pay refund an employee's college tuition, under certain conditions, "to stimulate greater interest in self-improvement through outside study as part of its plan for management and education development." The D&H joins other roads in recognizing that, in the long run, the company may be more successful in developing the kind of men it

needs by selecting good railroad men now in its employ who may not have had an opportunity for a college training and helping them get the thing they most want—a good education and a good job in a chosen field.

Trying to pick men who have gone through a technical school means annual competition with other industries. Building from the ground up means a head start with the advantage in the railroad's favor.

Is the Standard Diesel Doomed?

The pair of articles on economy fuels began last month and concluded in this issue of Locomotives and Cars lists nearly a dozen general conclusions that can be drawn from a wide survey covering all aspects of the economy fuel situation.

Perhaps the most significant conclusion to the mechanical man is the lack of consistency between the economy fuels. Unlike high grade fuels, all of which within any given specification have the same effect on engine performance and maintenance requirements, the effects from economy fuels vary all over the lot, even where the fuels have the same general physical specifications.

This raises the question of the advisability of making two revisions in diesel practice. Should existing limits for inspecting, repairing or replacing many parts be changed, and, will different limits have to be established for different locomotives depending on source of fuel?

Will a change be due on the engine itself? While the basic construction of the engine does not appear to need changing, what about injector timing and other settings? So far most roads seem to approach the problem from the standpoint of whether re-timing is *necessary*. Perhaps more emphasis should be placed on whether re-timing is *desirable*.

One road that changed injector, valve, camshaft and power output settings has found that operation is improved and the immediate maintenance problem at least is licked. Its engines now operate as well on economy fuel and the new settings as they did with the high grade fuel and the original settings. Compensating for the different fuel characteristics by changing the settings has also eliminated some trouble that was being experienced with stuck injector racks and cracked heads, valves, pistons and rings.

Horses for the Lightweights

Three of the lightweight trains, now in service or in the final stages of construction, are capable of developing for traction a little over three horsepower per ton of total train weight with a full passenger load. The three trains are each powered by one diesel-electric locomotive.

This, the critics say, is not enough for maintaining high-schedule speeds where stops are frequent and curves are many. With need for many accelerations from stops or slow-downs, they say, high horsepower is necessary for fast schedules.

This is true, but not all the lightweight trains will be used in this class of service. One of the lightweight trains is now making two 439-mile trips each day in 7½ hours for each trip, a schedule speed of a little less than 60 mph. This is 1½ hours less than a train consisting of standard equipment, which makes only a few more stops on the same run. The higher speed is accomplished by the fact that the low center of gravity of the lightweight train

permits higher speeds on curves and also because there is no front-end work to do at stations and station stops are very short. With only 10 intermediate stops, in 400 miles, high acceleration is not too important.

A fourth lightweight train, to have two locomotive units, will develop between five and six horsepower per ton. This will be used where slow-downs are many. The self-propelled cars with two engines each have something over seven horsepower per ton when fully loaded. This is comparable to electric multiple unit car practice.

One of the lightweight trains is to be hauled in some of its service trials by a diesel-electric locomotive, and in others by an electric locomotive. In the latter case, the operators have available, because of the short time rating of the locomotive, as much as 13 horsepower per ton for all the period required to accelerate the train. It affords an example of what can be done when power is available from an overhead wire.



SERVICEMAN, SALESMAN and cribbage champion

Meet Bill Olds.

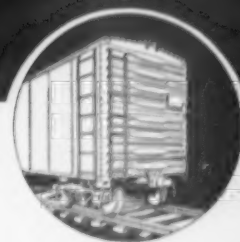
Bill is Standard Railway's head of sales for the U.S.A. This makes him—also—chief serviceman.

Everyone agrees that Bill's record as a serviceman and salesman for Standard equipment is outstanding. There are those who challenge his championship claims about cribbage.

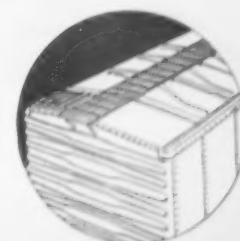
He quickly admits that his golf game is the week-end variety—and keeps trying.

But when it comes to business Bill is tops. Bill Olds and the men under him in Standard's organization pride themselves on a great reputation for *first quality products* and for giving their customers *first class service*.

Whether your order is for one car or hundreds, Bill is the kind of real salesman who is truly "at your service"—as close as your telephone.



Improved Dreadnaught End
Standard Railway components are lighter for equal strength, stronger for equal weight . . . increased car life . . . greater profitability.

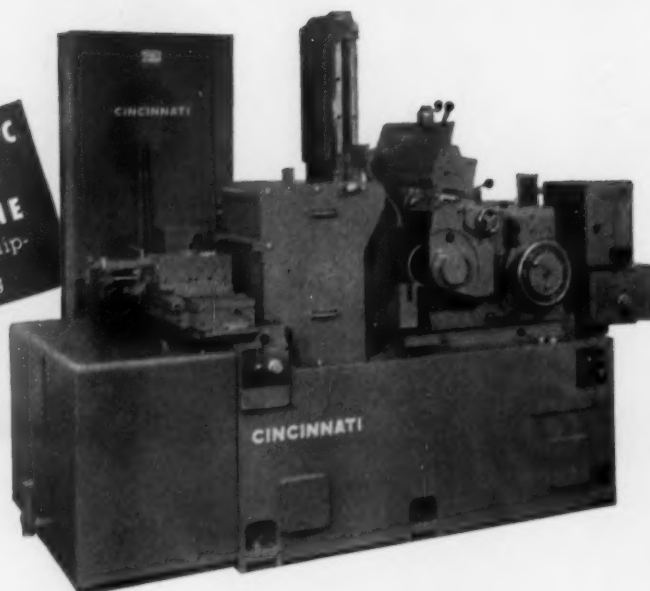


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Adds structural rigidity to the car. Costs less to buy and use. Makes money by keeping cars on the line.

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5 21 types of attachments and extra equipment, including automatic grinding wheel balancing.

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CINCINNATI FILMATIC No. 3 Centerless Grinding Machine. Of course, there are many other new features and advantages that you will want to know more about, such as: stabilized infeed screw for preventing localized wear; positive lubrication of regulating wheel spindle bearings; controlled warm-up of bed casting, to maintain uniform work size as machine temperature increases. Catalog No. G-664 contains complete information. Write for a copy.

CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO



First Train-X Goes to New York Central

Pullman-Standard's Train X begins revenue service on the New York Central under the appropriately spelled name "Xplorer." Following preliminary tests its initial public run on the railroad was a special 260-mile press trip from Cleveland to Cincinnati. The nine-stop 5½-hr schedule of the "Cincinnati Mercury" has now been replaced by the "Xplorer" making the same stops and scheduled at five hours between the two Ohio cities. The northbound "Xplorer" departure is much earlier than was that of the "Mercury."

A second, and basically similar, Train X will be delivered to the New Haven later this summer. Both have a two-axle center car and two semi-permanently connected pairs of single cars on either side of it for a total of 9 body units. Train X thus has the fewest axles of any of the low slung light side trains—ten for a nine-car train vs. 12 for nine Talgo cars or 18 for nine Aerotrain cars.

Pairs of semi-permanently connected cars can be added to or subtracted from the consist but Train-X cannot be split to form additional

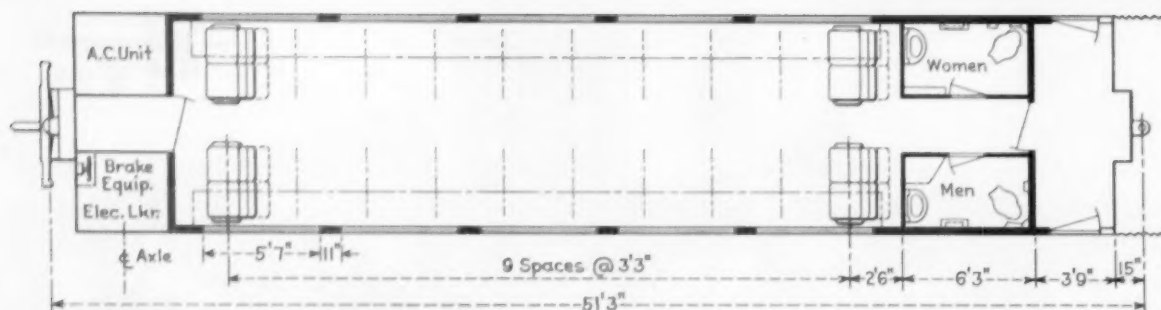
operating units. The two-axle center car is essential although this could operate between any pair of semi-permanently connected cars or it can be used at either end of the train by heading all the single-axle cars with

their axle ends away from the center car.

Adding or subtracting semi-permanently connected pairs of cars is a short simple task with the automatic coupling arrangement which per-



Entire interior is isolated from outer structure. Air duct is designed for low noise level and baggage racks are rubber mounted. Each window panel is a complete individual plastic moulding. Seat bases fit flush with floor so there are no pockets to collect dirt.



The longer of the two-unit Train-X cars has the washrooms and vestibules. There are seats for 40 passengers. The shorter unit seats 48 passengers.

forms two functions over and above connecting adjoining cars. It transmits the load of the carried car end to the axle of the carrying car, and it automatically connects the train service lines from one car to the next, making all necessary air and low-voltage electrical connections. Each coupler portion includes electrical connectors with multiple circuits and the two train air lines. Connections for the high voltage train line are above the inner diaphragm and are also made automatically upon coupling.

The entire structure of each body weighs less than 7,000 lb, including the end sections. For the 45½ ft length this comes to about 150 lb per lineal ft or 40 per cent that of the conventional car body. Adding the interior trim and equipment brings the weight to 13,000 lb for the 48 passenger compartment, or 300 lb per foot of length. Equipment in the end lockers, wheel wells, the couplers, etc. adds another 10,000 lb. Wheels, axles and suspension details bring the total weight to 28,400 lb per 48-ft car.

The entire 9-section train weighs less than 137 tons empty (excluding the locomotive which weighs 87 tons) and 169 tons loaded. This is about 700 lb per seat, or considerably less than half as much as a modern conventional-design lightweight coach of comparable luxury. Cost per seat (based on building 20 Train X's) is estimated at \$1650, or about \$1200 less per seat than with conventional coach design.

Extensive use of aluminum has been made in Train X and was explained in the May issue of *Railway Locomotives and Cars*. The superstructure is all aluminum and the underframe is largely of aluminum.

The latter introduces an aluminum alloy new to underframe construction—6061-T4. The underframe has center end sills and the center sill extensions at the ends of the aluminum center sill. The wheel wells and end sills are framed with welded high-tensile, low alloy steel. The center sill has a 24 sq in. cross section and can resist an 800,000-lb compressive force.

The entire aluminum superstructure, while tubular in shape, is basically of conventional structural design. The outside skin is Alclad aluminum for corrosion resistance. A non-metallic separator coating between aluminum and steel sections, as well as between adjoining aluminum sections, prevents the accumulation of moisture and its accelerating effect on corrosion and electrolytic action. The structure is assembled with mechanically driven aluminum lock bolts.

NYC Train X will have its exterior aluminum painted in blue and yellow. The second train for the New Haven will introduce an innovation—colored aluminum on the exterior. Each NH car will have a dark gray finish contrasted with natural metallic aluminum. The abrasion resistant surface is a layer of crystal clear aluminum oxide built up electro-chemically as part of the metal.

A "Box in a Box"

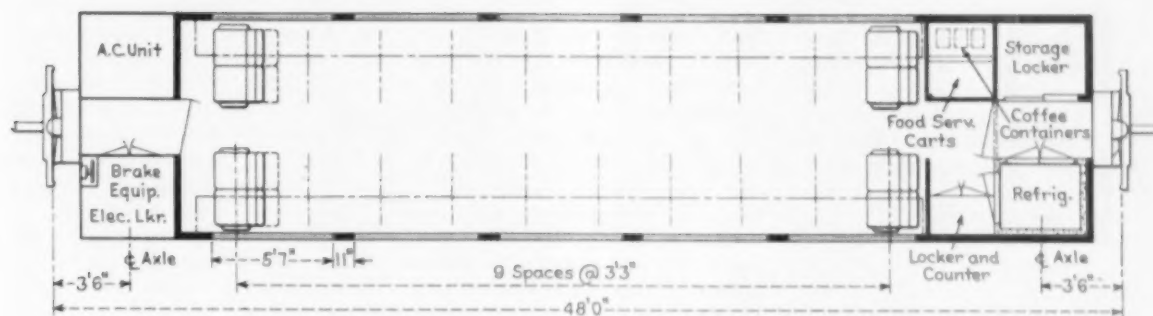
As the noise level naturally tends to increase as a car body gets closer to the rails, Pullman-Standard conducted special studies to acoustically divorce the interior of the car as far as possible from the running gear and structure. This objective was obtained by designing a body construction which is basically a sturdy exterior

box (the superstructure) to which a tight interior box (the inside finish) is flexibly mounted. The inside finish floats on the structure through flexible supports at all points of contact. The interior finish on the sides and ends is attached to the structure by vibration mounts or rubber strips specially designed for flexible mounting. The floor floats on resilient neoprene padding which corrects for vibration in three planes—longitudinal, vertical and lateral. No adhesive or bolting is required between the pads and the flooring or between the pads and the underframe.

Foamed-in-place insulation in the belly of the car is the first application of material of this nature to a railway passenger car. This type insulation was used initially for its thermal value but it has other advantages as well. It keeps sound transmission at a low level. It fills in all nooks and crevices, including right angles where batts or rolls leave voids between the insulation and the corner. The poured insulation also acts as a sheet stiffener.

An extra wide air space in the windows (1 in. vs the usual ¼ in.) decreases "acoustic coupling" between the panes. The greater air space is particularly effective in the speech frequency band, or the range of noise that interferes with conversation. This wider spacing between the panes transmits a minimum of vibration (hence noise) from the outer window to the inner window.

Air duct noise has also been studied to keep it to a minimum. The recirculating duct has a special acoustical lining in the bottom. The main air duct has waved sheets inside for a 4-ft length between the air conditioning unit and the beginning of the



The single-unit two-axle coach seats 40 passengers. It is around this car that the train is assembled. Remainder of coaches have only one axle per unit.

duct proper which gives the air a sinusoidal path for this length. The duct itself has the top and sides of 1-in. glass fiber insulation covered with a heavy vinyl plastic coating on the inside surface.

Metal panels are either treated with a sprayed or damping material, or they are damped by the plastic material used for the inside finish. Double wall sound barriers are used at the wheel wells.

Passenger Proof Interior

Primary objective of the interior car design was to make an attractive interior which would require the least possible maintenance without compromising weight or cost factors. None of the materials used in the car interior require paint and all are easy to clean.

The curved section of the ceiling is 1-in. thick glass fiber insulation formed to the contour with vinyl facing pre-bonded to it. This gives a finished ceiling plus insulation at the same time (although insulation is used also behind these sheets in the framing as on conventional cars). The vinyl covering can be washed and does not need painting. Each sheet extends from the center duct to the side and is 6½ ft long.

The walls are faced with either a vinyl material or a melamine (a hard plastic like formica or micarta). The two types of plastic are mixed primarily to give different decorative effects although service experience is expected to yield some comparative results on the relative merits of the two categories of plastics. Both types are bonded in place to .040-in. aluminum backing, forming the inside sheets. Insulation goes behind these

sheets just as on conventional cars.

There are three basic color schemes and end wall decorations. End finish materials are various decorative schemes using vinyls and hard plastics. Flooring is ¼-in. vinyl tile in 9-in. squares laid in different color patterns.

Seats are specially designed for light weight with comfort and ease of cleaning. Cushioning is of foam plastic (similar to foam rubber). The base of the seat fits flush with the floor all around. There are no dirt pockets in the base or between the base and the floor. The base of one seat also serves as the foot rest for the seat behind.

Upholstery is essentially of animal fiber for the seat and back sections where the passengers' body weight rests. Vinyl trim is used on the head rolls, the arm rests and the forward part of the seat cushion. Backs of the seat are also of vinyl to withstand scuffing. Again for comfort, the head rolls are exceptionally soft. The up-

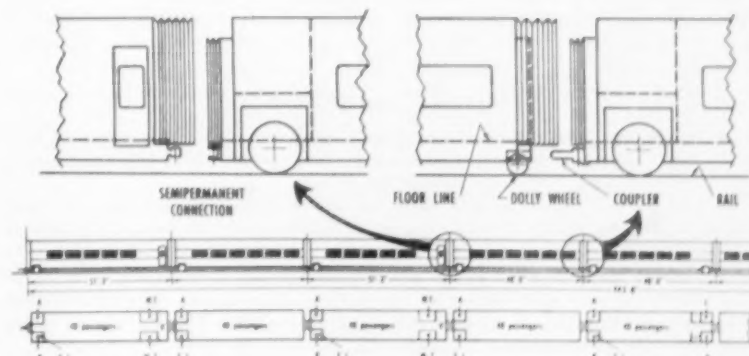
holstery is removable for cleaning through a zipper in the facing edges of adjoining seats. The seats are contoured, and have ash trays in each arm under the lever for reclining the seat.

The need for shades, blinds and draperies is eliminated by tinted window glass. The degree of tint is graduated with the lightest area in the approximate horizontal center. Large (26 in. by 66 in.) windows are used throughout the train. Body end doors and vestibule side doors are metal bonded to plywood.

Why An Air Spring?

Air rather than coil or leaf spring are used under Train X to give constant height and constant frequency. Weight changes, which go as high as 40% on some axles, would affect the stiffness and frequency of coil or leaf springs too much for satisfactory riding comfort.

The weight change is as great as



With 39-in. seat spacing, 392 passengers are accommodated on this train. Two-unit cars are semi-permanently coupled and there are dolly wheels at the unsupported ends for switching.

it is because the load on the blind end of a vestibule car is dependent upon its position in the train. If this blind end is at either the extreme front or the extreme rear of Train X, it supports only its own weight. When this end is within the train, it supports its own weight plus a portion of the weight of the non-wheel end of the adjoining car.

This difference in load on a coil or leaf spring would be too great to permit the same stiffness of spring to be used in either case. Body-to-rail distance would vary too much. Therefore, those axles with the stiffer springs would have to be used within the train length. Those axles with the softer springs would have to be used only at the front or the rear of the train where the load on them would be much less.

By using an air spring, constant car body height above the rail can be maintained regardless of load by adjusting the air pressure within the spring. This pressure is set at full when the car is in the middle of the train supporting the end of an adjacent unit. It is set at 60 per cent when the car is at the end of the train to compensate for the lesser weight on the springs.

The springs used under Train X are similar to those that have been in uses on buses. The rubber changes in diameter but slightly and this is due mainly to the deflection—not to stretching. Stretching is largely prevented by steel rings.

480-Volt Train Line Power

Auxiliary electrical loads are all handled by a head-end alternator located in the locomotive. It is driven by 570-hp diesel engine, and it furnishes 480-volt, 3-phase 60-cycle power. Total load for the 5-car 9-unit

train is 283.5 kw, including the maximum air conditioning load of 144 kw.

The main power trainline is a three-phase bus duct mounted in the roof space above the ceiling. Bus bars are aluminum and insulated, the bus duct casing aluminum and ventilated. On the connections between the cars, control contacts in the coupler head remove all load from the connection prior to making or breaking the main power contacts.

Each car is equipped with a three-phase transformer connected delta to the 480-volt train bus and star on the standby side (208-120 volt). Miscellaneous loads requiring 208 or 120 volts are taken off the star connection. On standby the car is automatically isolated from the trainline. Power is fed into the 208 volt star connection of the transformer and 480 volts are furnished to the air-conditioning and heating equipment from the delta side. [This was described and illustrated in the March, 1956 issue of *Railway Locomotives and Cars*, page 83.]

Train X is heated exclusively by electricity. With 40 per cent makeup fresh air (vs. the usual 25 per cent fresh air) about 30 per cent of the heat comes from the electric strip heaters in the sides below the windows (from which it discharges into the car by convection through slots under the windows). The remaining 70% of the heat is from the overhead duct.

Controls give either one-third or full heat. When car temperature drops below the control setting one-third of the heat capacity is applied in both the floor and overhead heat. If this first step cannot heat the car to the desired setting, a second contact gives full heat output from the same set of units. For standby heating the floor heat only is used to avoid the additional loss by introducing fresh air.

Batteries in the locomotive supply current to crank the engine and for the brake control circuit (64 volts). One small 6-volt battery in each car will operate emergency lights up to five hours. These emergency lights are strictly minimum, comprising two small bulbs in each passenger compartment and one in each vestibule. They are not intended for full car lighting under emergency condition.

Lighting in the NYC train is by four rows of fluorescent tubes in the overhead heating duct and one along either side for indirect lighting. Illumination is both directly downward and out the sides. The New Haven version of the train will have the two outside rows for indirect lighting and individual reading lights mounted on the baggage rack over each seat.

Individual Air-Conditioning Units

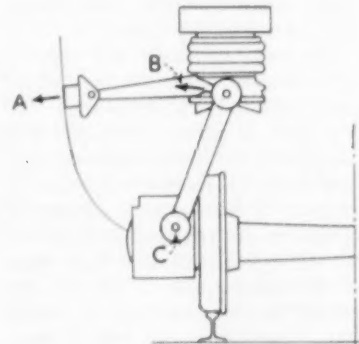
Each car has a completely self-contained air conditioning unit which plugs into the train line. The complete assembly includes a sealed motor-compressor unit, air-cooled condenser, split-coil evaporator, condenser fan, air-circulation fan, electric-heat coil and air filters. Distribution of the cooled air is through the same duct as the heating air which also contains the fluorescent lighting. As in heating, the air distributed is 40 per cent fresh and 60 per cent recirculated air. Discharge of the air into the car is through two strips of adjustable slot diffusers, one on each side of the air duct. The air conditioning unit is entirely self-contained and factory sealed.

The water system uses electric jackets for instantaneous heating of the water. Water can be added from either side and it is stored in a stainless steel tank located above the wash-

AIR SPRING AND SUSPENSION

When car goes into curve to the right, centrifugal force on horizontal strut at A moves B in an arc around C. This side of the car is raised and at the same time the other side is being lowered. Lateral restraint comes from torsion units at both B and C.

Since there is no restriction between the air tank and the bellows, air contained in both contributes to springing without increasing size of the bellows itself. Leveling of car is done by admitting air from supervisory train line or by discharging air from the tank. Slide valve in leveling control has $\frac{1}{4}$ -in. travel without initiating either action. As load varies in the car, or when there is any other action causing movement of the stabilizing arm, the car is maintained at a pre-determined height. Air pressures on car in the train which is supporting another car are 90 psi with full passenger load and 70 psi when the coach is empty.





room ceilings in each of the vestibule cars. Water flow is by gravity from this tank rather than by pressure. The non-vestibule cars do not have wash, toilet or drinking water facilities.

Brake System Not Standard

Train X is braked by the new Cobra shoe acting on the tread of the wheel. The single shoe on each wheel acts on the top rather than the side of the wheel as is typical of other single shoe brakes. Each shoe is applied by its own individual cylinder. A manual slack adjuster allows one adjustment after the initial setting, and this is sufficient to get complete shoe wear. The hand brake operates through the same push rod as the air cylinder.

Control is electro-pneumatic. One large and one small air line extends through the train. The large line is termed the supervisory line, the other the straight air line.

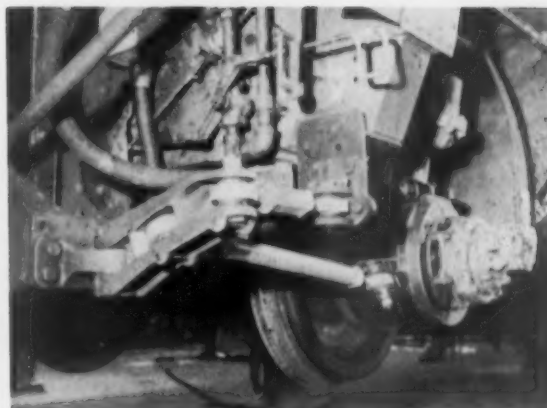
For a service brake application the engineman moves his control lever for as much brake as he wants. The further he moves the brake handle the heavier the application. Thus the Train X brake application depends on how far the lever is moved rather than on how long it remains in the application position as on regular equipment.

Moving the control lever sets up an electric circuit which energizes magnet valves on each car, causing air from the reservoirs to flow into the brake cylinders and the straight air line. When the pressure in the straight air line reaches the amount set on the control lever, further air flow stops (except to make up for any leakage) and the brakes remain applied at the pressure set by the engineman.

The second, or supervisory line, supplies air to the car reservoirs continuously, whether the brake is on or off.

It also controls emergency application. Any depletion of supervisory line pressure causes maximum brake cylinder pressure, whether the depletion occurs from an outside cause, as a break-in-two, or by the engineman's action in moving his control lever to its extreme position.

Failure of the electric control circuit automatically causes the straight air line to take over the brake application pneumatically. If movement of the control lever fails to build up straight air line pressure, a pressure differential is created in the control arrangement. This differential puts air in the straight air line and applies the brakes on each car in the same manner as the magnet valves but somewhat delayed due to (1) a short period of time to build up the



- ▲ Axle is made to bisect angle between car ends on curves with steering mechanism shown. Because brake cylinder is mounted on journal box, there is no relative motion between wheel and the downward-acting shoe.
- ▲ Coupling automatically connects two air lines, the 42 electric circuits in the coupler, and the three phase 480-v train line through the junction box over the end door. Air cylinder then raises dolly wheels.

pressure differential, and (2) the pneumatic delay in filling the line from the front to the rear of the train (although the delay generally would not be enough for the engineman to notice).

The system has another feature, which permits a car to be used anywhere in the train without underbraking under one condition and overbraking under another. The braking pressure is varied according to the axle loading as was done with the pressure on the air spring. When a vestibule car is used at the end of the train, and is therefore not supporting an adjoining car on its end, the braking force on its axle is reduced to 60% to conform to the lesser weight on the axle. When a vestibule car supports an adjoining car on its end, 100% braking force is applied. The switchover is made by changing the air flow circuit between two diaphragms—one of which establishes brake cylinder pressure at 60% of the straight air line pressure, the other at full line pressure.

While this system, known as the LWE, cannot be used to control cars with standard automatic brake equipment, the Train X locomotive can be equipped with a triple valve device that will allow a conventional towing locomotive to actuate the pneumatic straight air feature and to charge the reservoirs.



CHARACTERISTICS OF NYC LOCOMOTIVE

Length, Ft-in.	58-9
Height, Ft-in.	11-0
Width, Ft-in.	10-0
Wheel Base, Ft-in.	43-7
Propulsion	
Horsepower	1,000
Auxiliary	
Horsepower	570
Continuous	
Speed, Mph	126.
Cont. Tractive	
Force, Lbs.	21,000
Maximum	
Speed, Mph	120

B-L-H Diesel Mec-hydro Unit Powers Xplorer

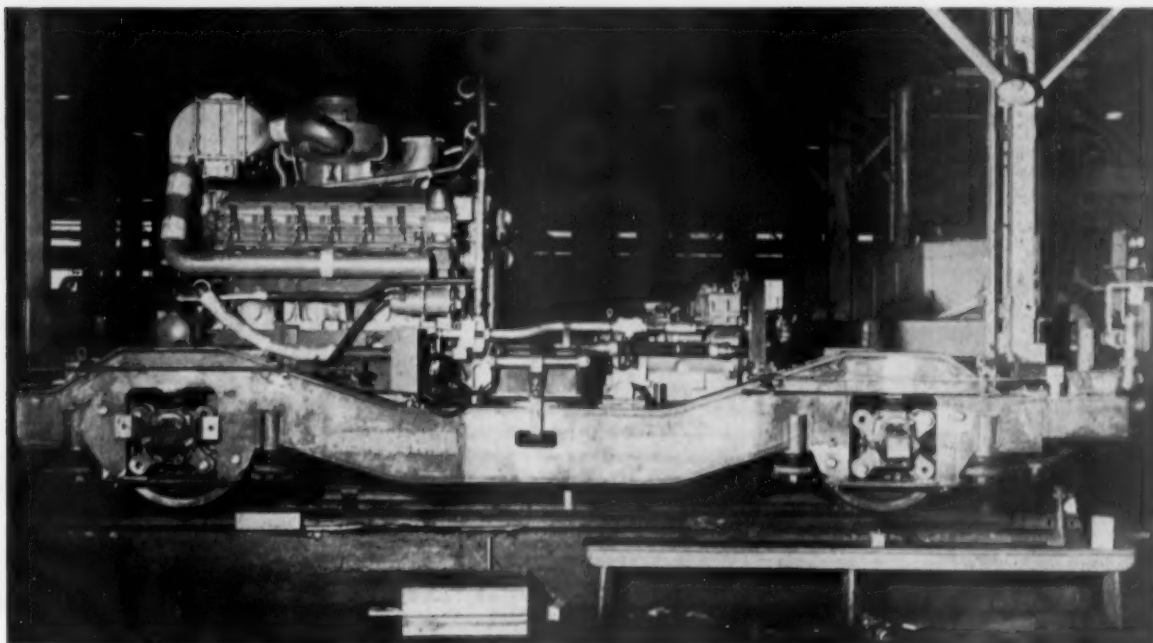
New designs and arrangements are incorporated in the Xplorer locomotive. All power is delivered through the two-axle front truck. This front truck is a complete power package having the diesel engine, hydraulic transmission and axle drives all mounted on it. The locomotive body is suspended from both trucks by body swing links designed to allow the locomotive to operate through curves at high speeds. The complete power truck is arranged so that it can be removed and replaced quickly to obtain maximum locomotive utilization.

The 1,000-hp propulsion diesel is a German-built, high-speed Vee-type engine which delivers its power through a Mec-hydro hydraulic transmission. This torque converter-mechanical drive is also German-made. While both are new to American high speed service, the Maybach diesel has been used for over 15 years on European railroads, and this type of transmission has won acceptance. The transmission has four speeds in forward and in

reverse which are claimed to give high efficiency over the entire speed range.

Mounted in the body of the locomotive is an eight-cylinder Maybach engine driving a 300-kw, 440-volt, 3-phase, 60-cycle generator. This engine has many components interchangeable with those in the propulsion engine, and supplies the electric power for the entire train.

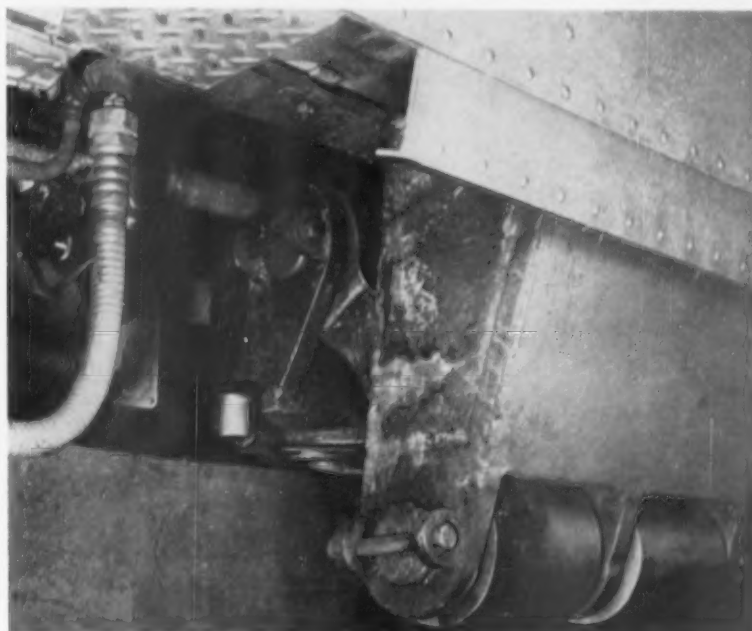
The Maybach engine's appearance is not unlike that of more conventional Vee-type diesels. Apparent differences are the vertical shaft turbocharger mounted between the two cylinder banks on the top of the engine, the turbocharger intercoolers, and the short overall length of the engine itself. In Europe this power plant is known as the "tunnel" engine. This comes from the shape of the crankcase which combines the frame and bedplate into one piece, and from the large main bearing bores. Roller type main bearings are used instead of conventional friction bearings.



In this power truck the Maybach engine drives the transmission and axles through flanged shafts. Mec-hydro is combination torque converter and hydraulically operated gear transmission with four forward and reverse speed ranges shifted by overrunning claw type clutches (Railway Locomotives and Cars, September, 1955, Page 77). Torque converter is permanently filled and during shifting a set of reverse

blading moves into the fluid stream to give a weak backward torque so that gear trains can be synchronized and clutches will engage smoothly. Axle drives are in cast steel housings and mounted in roller bearings. Gears are spiral bevel type. Forced-feed oil system has integral gear pump lubricating gears and axle bearings. Torque rods run from drive units to truck and from truck to the body.

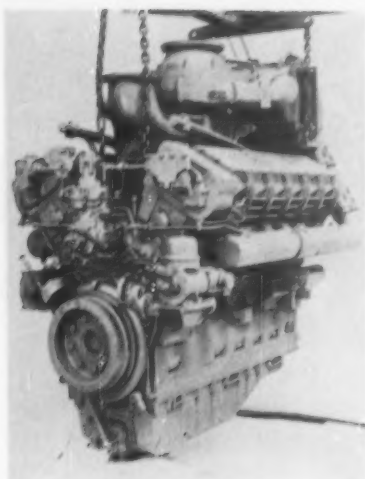
Swing link suspension is used over both the power and idler trucks. Design is intended to provide satisfactory riding and tracking characteristics at the high speeds which are achieved by this locomotive.



All combustion air is cooled after leaving the turbo-charger and before it goes into the cylinders. The engine has a weight of approximately 10-lb per hp—less than that of US locomotive diesels. Both the propulsion engine and the smaller auxiliary engine operate on a four-stroke cycle.

The crankshaft has solid disc webs used also as the inner races for the roller main bearings. This shaft design permits use of longer crankpins and closer cylinder spacing. The short disc-webbed crankshaft with large diameter crankpins is claimed to reduce crankshaft twist and torsional vibration.

MAYBACH ENGINE



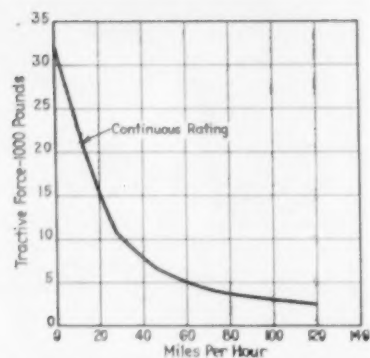
Propulsion Engine

Horsepower 1,000
Speed (Rpm) 1,550
Number of Cylinders Twelve

Auxiliary Engine

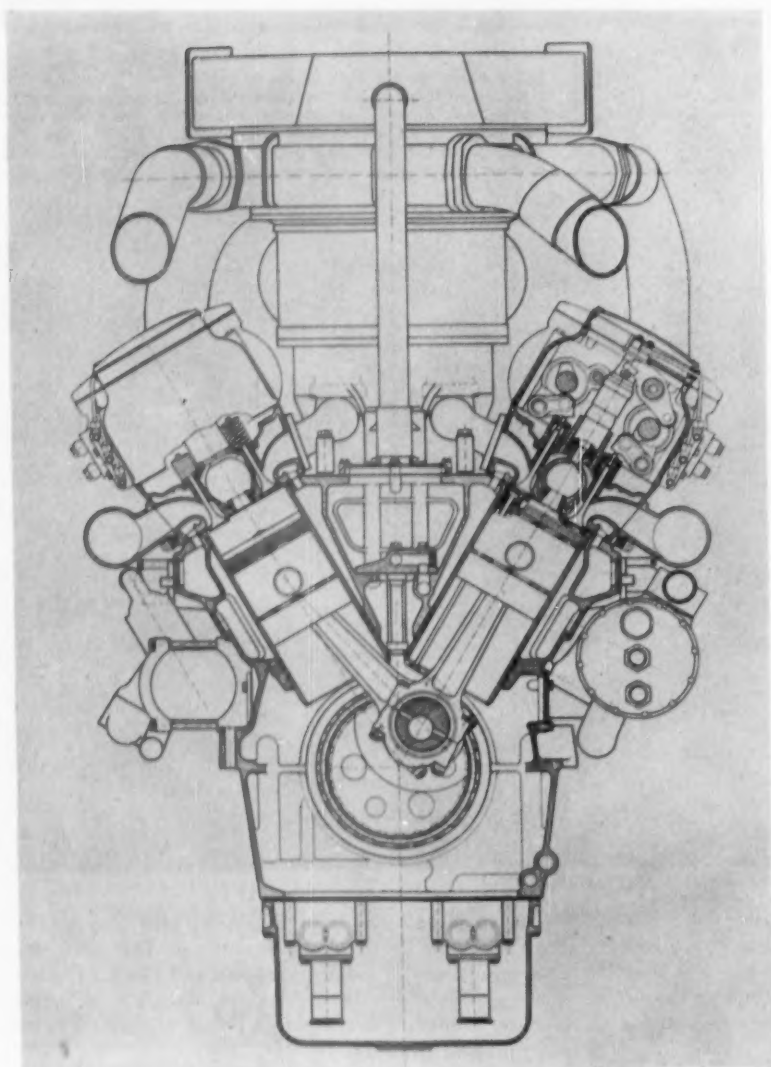
Horsepower 570
Speed (Rpm) 1,200
Number of Cylinders Eight

Bore of both Maybach engines is 7.3-in. and the stroke is 7.9-in. Heads have three inlet and three exhaust valves along with spherical pre-combustion chamber. Unit type injector has single large diameter fuel delivery port. Roller bearings are used for the crankshaft mains.

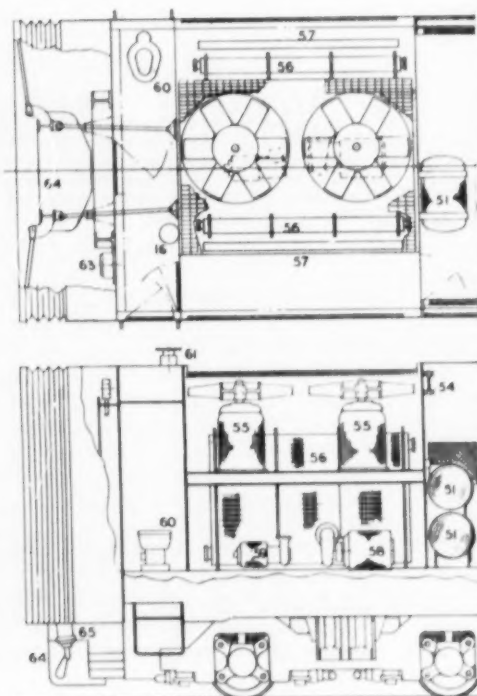


Tractive force curve is relatively smooth although transmission is shifted three times over speed range. Both locomotive and engine speed automatically determine when shifting is done.

COMPONENTS



1. Train Safety Control
2. Air Brake Control Equip.
3. Emergency Fuel Cut Off
4. Fireman's Seat
5. Engineer's Seat
6. Cab Heater
7. Hand Brake
8. Speed Recorder
9. Control Stand
10. Parking Brake Valve
11. Electro-Pneumatic Brake Valve
12. Train Control Ack. Whistle
13. Train Control Acknowledger
14. Horn Valve
15. Inspection Reports (R.S.)
16. Fire Extinguisher



The connecting rods are fork-and-blade type. Pistons are of two-piece construction with removable forged steel crowns which carry the three compression rings. The water-cooled cast iron liners are supported at the top, center and bottom to insure exact alignment and for maximum reinforcement. Dual seals are used at the bottom of the liner with a tell-tale hole in the block which drains the space between the two seals. This is to detect leaks and to prevent water dilution.

With three inlet and three exhaust valves in each head, the heat load per valve is low, and because these valves are arranged in a circle around the combustion chamber, gas flow is improved and the rigidity of the head is increased.

There is a spherical combustion chamber in the center of the head into which the nozzle of the unit-type injector delivers fuel through a single relatively large hole. The injectors are controlled by a worm drive connected to the governor control mechanism. Over each

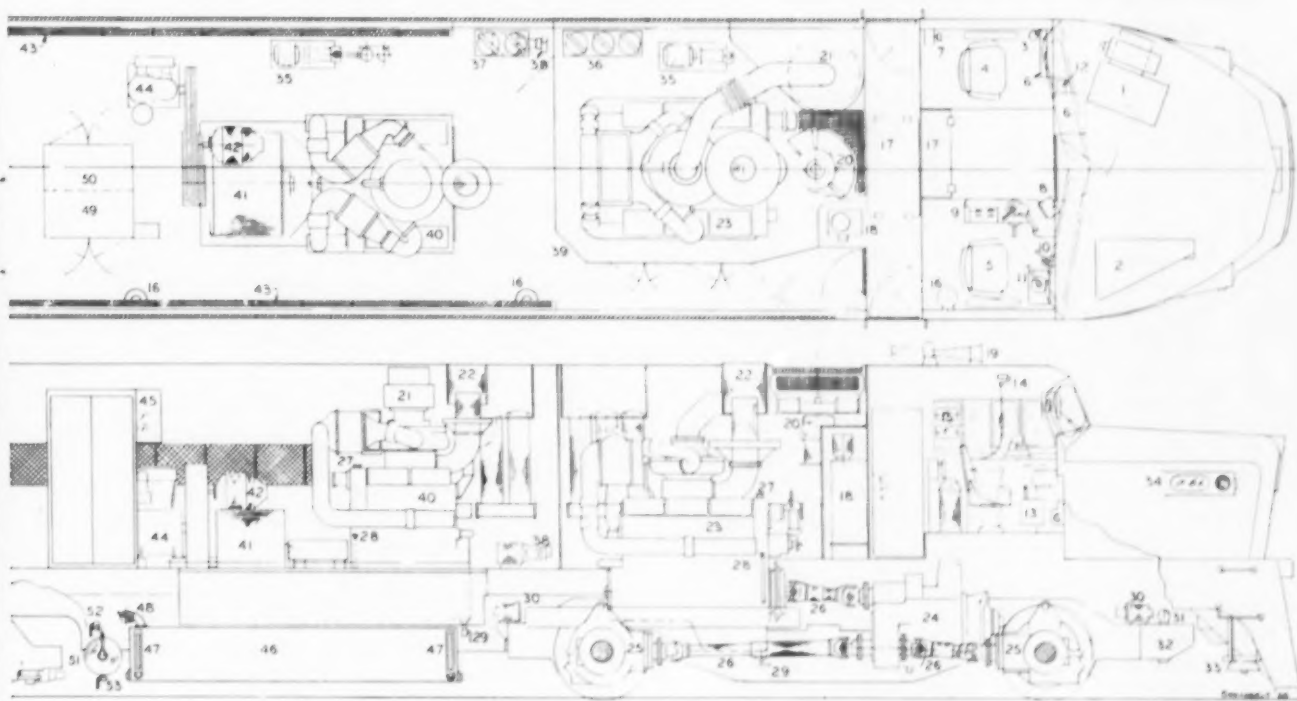


Storage battery is used for engine starting and for supplying power for control circuits and lighting.

cylinder bank are two camshafts, one for the exhaust and the other for the intake valves. The low-inertia valve rockers have hydraulic lash adjusters.

OF NYC LOCOMOTIVE

- | | | |
|--------------------------------------|-----------------------------------|---|
| 17. Inspection Door (Transmission) | 33. Bell | 49. Battery Charging, Pumps, Fan Control Equip. |
| 18. Water-cooler (elec.) | 34. Number and Class Light | 50. Train Power & Loco. Control Equip. |
| 19. Air Horn | 35. Pre-Lube Pump | 51. Air Reservoir |
| 20. Cooling—Supercharger Intercooler | 36. Lube Filter (Main Engine) | 52. C.O. Cock |
| 21. Engine Air Filter—Oil Bath | 37. Lue Filter (Aux. Engine) | 53. Drain Cock |
| 22. Exhaust Stack | 38. Fuel Oil Transfer Pump | 54. Water Gauge (Expansion Tank) |
| 23. Propulsion Diesel Engine | 39. Propulsion Engine Compartment | 55. Radiator Fan & Motor |
| 24. Torque Converter Transmission | 40. Auxiliary Diesel Engine | 56. Radiator Cores |
| 25. Axle Drive | 41. Generator (AC) | 57. Radiator Shutters |
| 26. Drive Shaft | 42. Exciter | 58. Water Pump (Main) |
| 27. Lube Oil Filler | 43. Air Filter Panels | 59. Water Pump (Aux.) |
| 28. Lube Oil Level Indicator | 44. Compressor | 60. Toilet |
| 29. Lube Oil Drain | 45. Aux. Engine Panel | 63. Back Up Light |
| 30. Brake Cylinder | 46. Fuel Oil Tank | 64. Coupler (Train) |
| 31. Sand Fill | 47. Fuel Oil Gauge (RGL) | |
| 32. Sand Box | 48. Fuel Oil Filler (RGL) | |



This engine has three separate lubricating oil systems—piston cooling, valve gear, and major running parts (crankshaft and connecting rod bearings). There is also a pre-start lubricating system which insures lubrication before the engine is started. The governor is a variable speed hydraulic relay type driven by gears and incorporating a low oil pressure shutdown.

Mec-hydro Transmission

The Baldwin Maybach hydraulic transmission is fully automatic—responding to both locomotive speed and engine load demands. Operating controls are an integral part of the transmission. The disengaging torque converter has an impeller driven by the engine, and a turbine with two sets of blading which shift along its axis to engage or disengage the output shaft. The control system does the shifting automatically, and is arranged to prevent reversing of the transmission even though the operator throws the reverser before the locomotive comes

to a complete stop. Gears are always meshed, and the changes are accomplished by engaging or disengaging the claw clutches. The transmission is cooled by water bypassed from the radiator system through the water jacket surrounding the torque converter and the transmission oil heat exchanger.

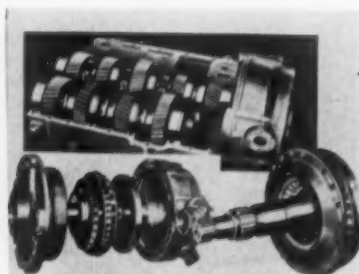
The cab is conventionally arranged. The diesel engine is located in a compartment extending up through the locomotive body and is inspected from inside the locomotive through a series of doors around and over the power plant. Because of the relative movement between the truck-mounted diesel and the body, flexible connections have to be provided in the fuel and cooling water lines.

Radiators for the power plants and for the transmission are located at the rear of the locomotive body. The coupler at the front is a conventional retractable E type which makes it possible to handle this unit with a standard locomotive. At the rear is the special coupler required for the Xplorer equipment.

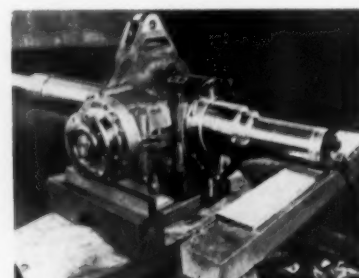
DETAILS OF B-L-H POWER TRUCK



Mec-hydro Transmission

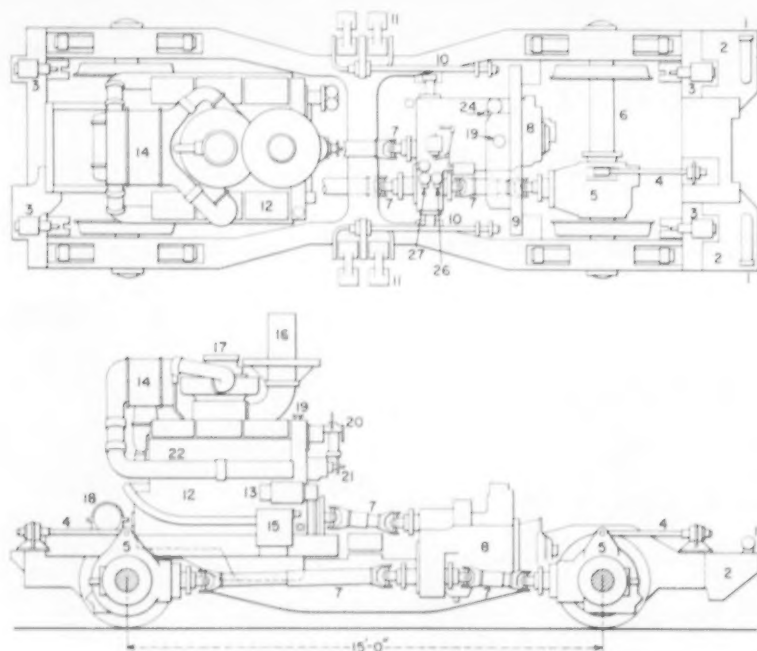


Turbines and Gear Box

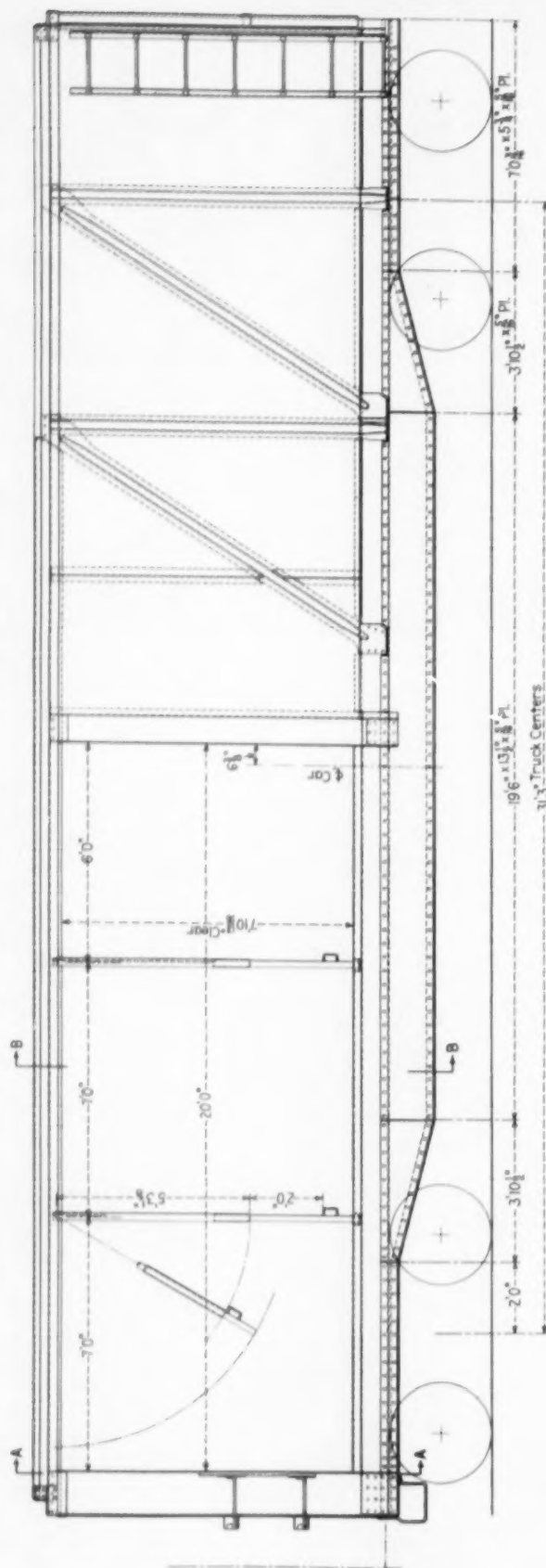


Axle Drive Unit

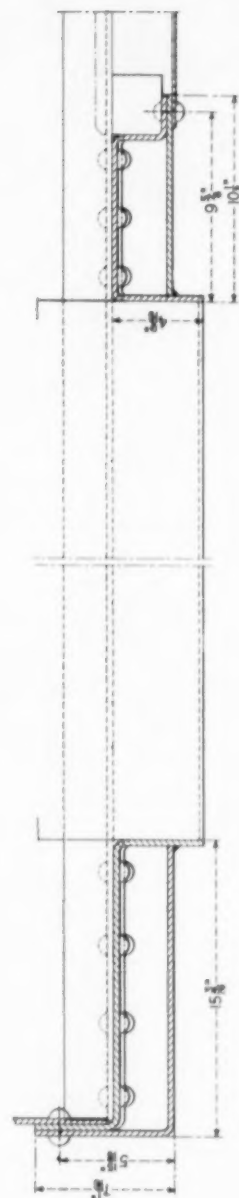
1. Sand Fill
2. Sand Box
3. Brake Cylinder
4. Axle Drive Torque Rod
5. Axle Drive
6. Driving Axle Assembly
7. Drive Shaft
8. Transmission
9. Transmission Support
10. Truck-to-body Torque Rod
11. Swing Links
12. Propulsion Diesel Engine
13. Starting Motor
14. Supercharger Intercooler
15. Electric Junction Box
16. Exhaust Stack
17. Air Intake
18. Heat Exchanger—Pist. Cool Oil
19. Lube Oil Filler
20. Fuel Oil Filter
21. Governor
22. Air Intake Header
23. Overspeed Control
24. Oil Level Indicator
25. Oil Fill—Loading Pad
26. Starting Solenoid
27. Forward & Reverse Solenoids



General Arrangement of Seaboard's Wide-Door Box Car



Two telescoping posts pivoted from top plate protect the car doors from movement of the lading while in transit. Posts can be swung up and fastened out of the way during loading and unloading. The reinforced side sills were backed up with a redesigned crossbearer located on the centerline of the car. The section (below) through the door opening shows the construction of the new end post and door post which are pressed from plate and after welding produce a box-shaped structure at both locations.



10-gauge copper bearing steel was applied over the posts and braces and the car was then given a standard wood lining.

Details of Reinforcement

The original 4 1/16-in. x 10.3-lb Z top side plate was reinforced with a 9 x 4 x 1/2-in. angle and the side sill channel was strengthened with a 5/16-in. plate stiffened at the bottom edge with a 3 1/2 x 3 x 1/2-in. angle. The 20 x 1/2-in. top and bottom bolster cover plates were replaced with 22 x 5/8-in. cover plates. At the center of the car the original 5/16-in. pressed cross bearer with 6 x 1/2-in. top and bottom cover plates was replaced with a redesigned type necessitated by the deeper side sill construction.

The new doors are built by the Youngstown Steel Door Company and each has a width of 10-ft. The center door rolls back on its own track over the fixed portion of the car side. This gives a 10-ft opening. The full 20-ft opening is available when the second (end) door is rolled back on its separate track and comes to rest beside the center door.

The door tracks are applied to a 5/16 x 8-in. deep Z shaped reinforcing plate applied on the outside of the side sill below the door opening. The original corner posts and door posts were removed and larger pressed plate type posts were installed to give the necessary strength for the larger side openings.

The car was designed by E. L. Cook, Seaboard mechanical engineer, and was constructed in the SAL Portsmouth shop.

WHAT SHOULD BE USED TO STOP WHEEL SLIP?

Southern Pacific locomotive 1339 was prepared at Bayshore Shops for test by having the brake rigging on the front pair of wheels removed. This was necessary to prevent application of brake shoes against these wheels. Marker strips were applied to the outer rims of the test wheels to facilitate observation of slipping. Ammeter

shunt was connected to generator and current was measured by two separate recording millivoltmeters. Voltage across the armature on the front axle traction motor was measured by two other instruments.

A quick-acting push button cut-out was installed on the throttle PS-21 switch in the generator and exciter

field circuits to provide means for stopping wheel slipping instantaneously. This push button was operated by an observer near the test wheel. Test rails were 110-lb. size. The locomotive was run back and forth several times to condition rail surfaces prior to test. Rails were dry wiped before the first test. Between succeeding tests, rails and test wheel treads were wiped and cleaned with carbon tetrachloride to remove any residue from preceding tests. Brakes were set on the diesel wheels other than the observed pair, and to prevent the locomotive's forward movement, a consolidation type steam locomotive with its brakes set was coupled to the diesel.

Under each test condition, and with brakes set on the test locomotive, the throttle was opened on the diesel until the front wheels slipped. The amperage peak and the voltage prior to the slip were measured by instruments. Immediately on slipping, the cut-out switch in the field circuits was actuated to stop slipping. Test wheels were rotated to a new location on rail several inches from preceding test spot and test was repeated. Between each set of test conditions, wheel and rail surfaces were cleaned.

Calculation of the torque corresponding to amperage readings from the various tests with this Alco switcher came from this formula:

$$\text{Tractive Effort} \times \text{Wheel Radius (Ft.)} = \text{Gear ratio}$$

Tractive effort figures came from a curve for the GE 731 traction motor. This switcher has 40-in. wheels and 75 to 16 gear ratio.

More on Sanding



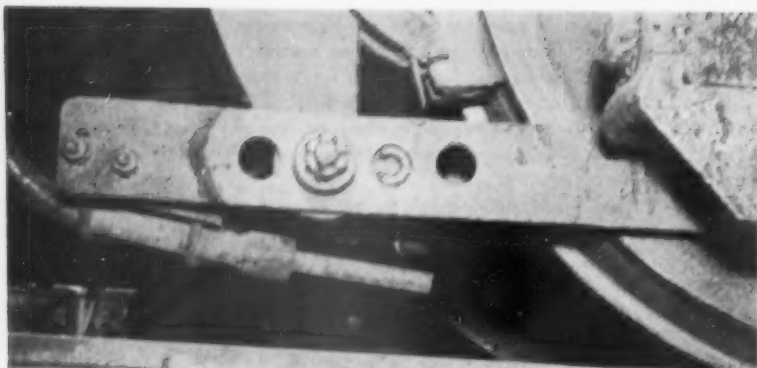
What Are The Most Effective Anti-Lubricants?

Test Conditions	Breakaway Torque (Ft Lb)
Oily rail and wheel	2,100
Dry rail and wheel polished with steel wool	4,000
Dry rail and wheel at start of tests	4,150
Dry wheel conditioned by brake shoes	5,400
Oily wheel and rail, wheel sprinkled with #3 ground silica (325 mesh) on water containing wetting agent	5,750
Oily wheel and rail, wheel sprinkled with SP-199B loco sand on water containing wetting agent	5,900
Oily wheel and rail, wheel sprinkled with #1 ground silica on water containing wetting agent	7,300
Dry wheel and rail with 60-mesh sand on rail	7,600
Dry wheel and rail with #2 ground silica (200 mesh) on rail	7,750
Dry wheel and rail with SP-199B sand	7,900
Dry wheel and rail with #1 ground silica (100 mesh) on rail	8,200
Dry wheel and rail with #3 ground silica (325 mesh) on rail	8,300

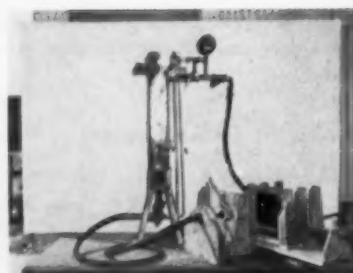
How Should An Anti-Lubricant Be Applied

Test with No. 1 Ground Silica (100 Mesh)

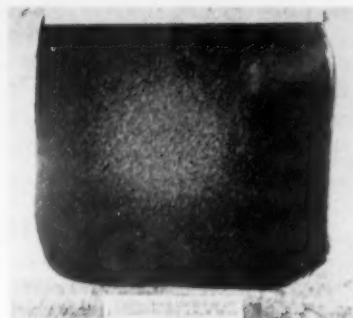
Application Method	(Ft Lb)
Sprinkled dry on wheel	4,550
Blown dry on wheel with compressed air	5,000
Sprinkled on wheel and sprayed with water on an oily rail	5,800
Sprinkled on wheel and sprayed with water	7,200
Sprinkled on oily wheel and sprayed with water containing wetting agent (alkyl aryl sulfonate)	7,300
Sprinkled on rail and sprayed with water	7,500
Sprinkled on wheel and sprayed with water containing wetting agent (butyl cellosolve)	7,750
Applied dedusted to dry rail	8,000
Sprinkled on wheel and sprayed with water containing wetting agent (alkyl aryl sulfonate)	8,150
Applied dry to rail	8,200



Application of redesigned sanding system including new nozzle design (above) was made to the EMD road freight units after . . .



Test stand experiments (upper right) with both the sand traps and nozzles had produced viscous-coated metallic plates showing the . . .



Sand dispersion patterns which were photographed. Comparisons showed that new nozzle (lower right) gave minimum of dispersion.

How SP Cuts Sanding—And Slipping

Rearrangement and redesign of sanding system components are aimed at 83 per cent reduction in sand consumption

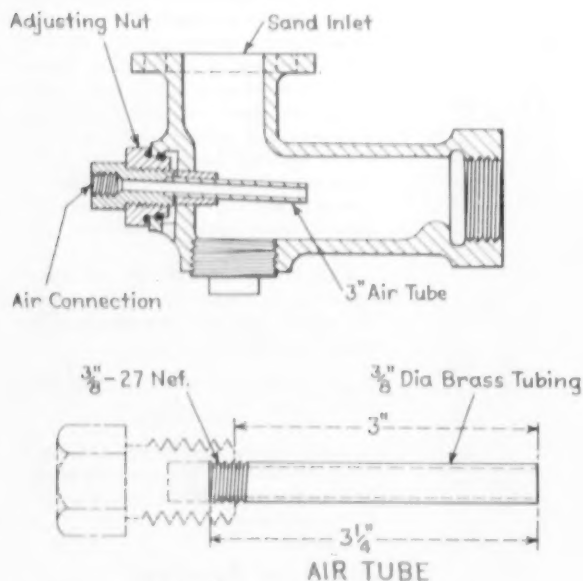
Southern Pacific freight units are using less sand and doing less slipping because of a lengthy investigation of wheel slip. Problems confronting the SP and research

objectives of a joint committee from the motive power and engineering departments were:

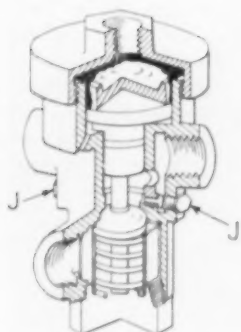
- Reduction in wheel slippage by more efficient sand application reducing damage to equipment and rails.
- Reduction in amount of locomotive sand used which with purchasing, transporting, drying and storing charges costs about \$450,000 annually.
- Reduction in fouling of ballast which becomes a major road bed and track maintenance problem estimated to cost SP at least \$500,000 annually.

The joint committee did actual application engineering with the benefit of two laboratory research programs previously sponsored by the SP. In 1948 Battelle Memorial Institute and in 1954 Stanford Research Institute had made reports indicating that railroads had not been wrong in choosing sand as the "anti-lubricant" to improve driver-rail adhesion.

Stanford had found, and SP road tests had confirmed, that silica flour with a fineness of 100 to 325 mesh is the most effective solid material for wheel slip control. In this form it is difficult to handle in storage and on the locomotive—not feasible for actual use. However, ordinary 65 mesh silica sand is reduced to silica flour when ground between the locomotive wheel and the rail. Sanding equipment needs only deliver the sand to this point. Laboratory work showed that a layer of this silica sand only one particle thick effectively controls wheel slip. Quality is of extreme importance. Conditions which can reduce the sand's effectiveness as an "anti-lubricant" are

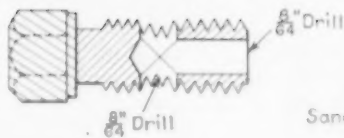


End of air tube extension in the sand trap is not now always covered with sand as was the case with the original arrangement.

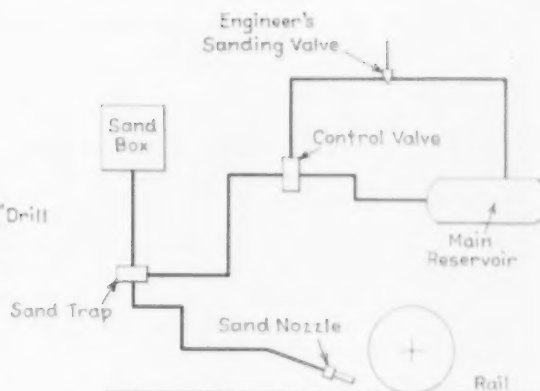


CONTROL VALVE

Volume of air delivered was increased by enlarging the hole in the metering screw in the side of the control valve. Relation of this valve



DETAIL OF J



SCHEMATIC PIPING DIAGRAM

to the other parts of the system is shown at the right. There have been changes in the control valve, sand trap, and the nozzle.

improper screening, and presence of clay, fines and moisture.

Preventing wheel slip on locomotives operating at 14 mph, a critical speed for slippage on heavy grades, can be done with 1/4-lb. of sand per minute, if all of this sand is utilized. Wind losses and shifts of the wheel with respect to the rail were compensated by providing for 50 per cent losses. This meant that the project would work on the delivery of 1/2 lb. of sand per minute in front of each locomotive driving wheel. It was found that present sanding equipment, designed to deliver 3 to 5 lb. per min., can be modified easily to provide the amount of sand and a sanding pattern which work effectively. Correct placement of the reduced amount of sand can be done only by assuring alignment of the sand pipes. It was established that the smaller quantity of sand is more effective than excessive amounts in producing the desired results.

The committee recommended that the air tubes on all Prime sand traps be lengthened from 2 1/8-in. to 3-in. This means that the end of the tube will not always be covered with sand at its normal angle of repose, and is the only way to make the desirable small delivery rate possible.

The orifice in the metering screw of the Prime control valve was enlarged to provide a larger volume of air during sanding and a consequent higher velocity through the restricted path. The result was a sand velocity at the nozzle adequate to place sand at the wheel-rail contact point and to offset the effects of side winds with velocities even greater than 35 mph. A secondary result of the orifice enlargement has been a reduction in failures due to plugging with minute air stream particles.

Along with providing an air velocity to assure adequate delivery, the SP is applying a newly designed nozzle which has been found to produce a delivery pattern with a minimum of dispersion. This nozzle is made of from standard 1-in. pipe and fittings. It is claimed to be self-aligning and self-positioning. Further assurance of delivery at the wheel-rail contact point was made by designing a new bracket applied to the brake slack adjuster and by developing a stabilizer applied to the brake rigging to prevent its lateral movement. Both of these devices assist in giving precise alignment to the sand pipe and neither prevents compliance with ICC regulations concerning clearance between the sand nozzle and the rail.

The sand used during the development work and which



Experiments at Bayshore, near San Francisco, showed that laboratory work had correctly indicated the proper "anti-lubricant." Various appli-



cation methods were tried (left), and prolonged wheel slip was prevented when ground observer operated cut-out switch in field circuit.

was rated by the SP as an "ideal" material had the following characteristics:

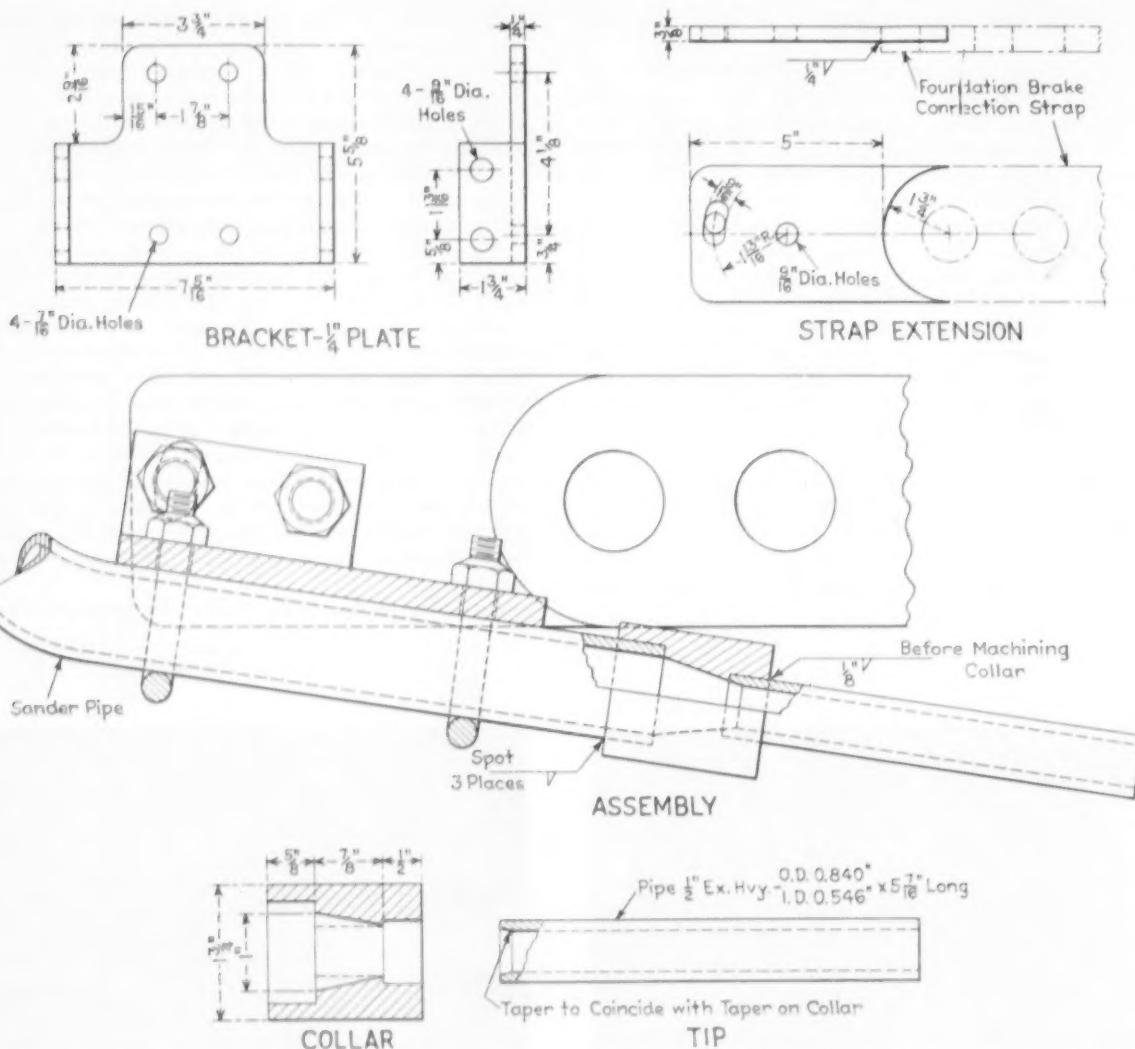
Held on 10 mesh screen	None
Held on 20 mesh screen	5 per cent
Held on 65 mesh screen	95 per cent
Through 200 mesh screen	None
Clay or fines (by volume)	None

Without sand of this type the committee stated that their equipment modifications would be largely nullified. Dry sand is of great importance. Not only must the sand be dry when delivered to the locomotive, but it must stay dry once it is placed in the sand boxes and until it is delivered to the rail. When operating with the reduced amount of sand, it was found that all sanders must be operating.

The committee recommended that sand box gaskets be renewed whenever necessary to keep moisture out of

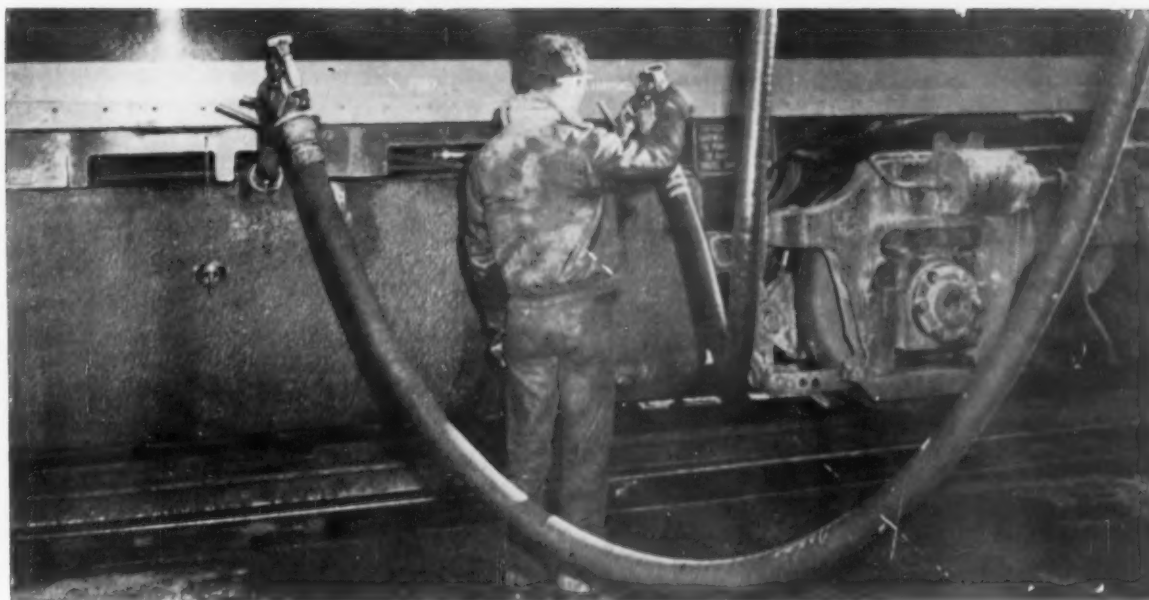
locomotive sand. This moisture can enter when the unit is going through mechanical washers. Gaskets under the sand box and under the deck plates also can be entry points for moisture. Air contained in the compressed air can be eliminated by automatic drain valves in the reservoirs, water separators in the air lines, and by moisture separators ahead of the sanders. Oil entrained in the compressed air comes from the compressor. While the committee felt that some oil could be removed by separators and drains, they stated that the condition should be corrected at the compressor itself.

Already this work is lowering SP sanding consumption toward a predicted goal of an 83 per cent reduction. However, work will be continued on refinements in locomotive design and in the methods of actuating sanding equipment. These should further reduce wheel slip and amount of sand used. Projects to do this include time limited sanding, traction motor regrouping, automatic wheel creep sanding, and automatic wheel creep braking.



Details of the redesigned sand nozzle include provision for accurate adjustment of the sand stream. Changes which were made in the actual

nozzle were tested and SP was satisfied that arrangement produced a delivery pattern which put the sand at the wheel-rail contact point.



PART 2 Economy Fuels

- *Who uses them*
- *What kinds*
- *Under what conditions*
- *With what results*

This installment continues our analysis of the present and future fuel supply and the effect of fuel quality on diesel operation. Last month we listed ten general conclusions from a widespread survey of railroad and associated industry spokesmen in a position to speak authoritatively on one or more aspects of the overall railroad fuel situation.

The following (and concluding) installment continues our discussion of individual experiences with stability, compatibility and mixing limits of economy fuels. It covers the inter-relationship between fuel and lube oil, the effect of the locomotive's assignment on the fuel required and a summary of results with dual fuel systems. It begins by telling some things that additives can and cannot do and where caution is called for in their use. EDITOR

Fuel has limited tolerance for additives. Whether the additive should be put in the fuel at the refinery or later is debatable. Opinion is divided on this point. Advocates of refinery addition believe that lower concentrations can do the job when the fuel is fresh.

Overdosages and mixing can introduce problems more serious than when additives are not used. The principal problem, quite naturally, occurs from mixing fuels which do not act favorably with additives with fuels which require additives. Where fuels with additives are mixed,

the incompatibility of the fuels is usually the critical factor rather than the incompatibility of the additives.

A problem also arises from cases where an additive might be considered "over-effective," i.e. where the additive has served not only to prevent the formation of new residue but has cleaned up the residue which had clung to the sides of the tank and caused it to go into solution. Some metal-base additives are also thought to cause glowing sparks to be emitted from the stacks.

In the aggregate, however, fuel oil additives are felt to offer substantial benefit if used judiciously. While they do not effect compatibility, they do increase stability in storage by slowing up formation of insoluble residue and breaking up residue already formed to prevent sludging in storage tanks and plugging filters on the locomotive. Additives are also available for reducing the pour point, which has in some cases eliminated the need for heating facilities in storage tanks and for emptying tank cars. Other functions of additives are to prevent injector sticking, to increase cetane rating, to reduce smoke production by improving combustion, and to reduce corrosion.

Inter-Relationship to Lube Oil

A couple of years ago a 2,000-hour test was run in four 500-hour increments with a 36 cetane, 1.07% sulphur fuel. The engine was inspected after each 500 hours. Four different lube oils were used, one in each period. The four types were a high additive type prepared especially for handling high sulphur fuels, a high additive level of the extra quality type, a normal additive type,

and a low level additive oil. A parallel series of tests was run using the same lube oils but with the second engine operating on premium diesel fuel for comparative purposes. Cleanliness of the engines varied considerably with the lube oil but there was no variation of consequence that could be attributed to the different fuels.

Partially confirming and partially contradicting this test are the results of a road test with three different four-unit freight locomotives. The test started out using cat cracked economy fuel on one locomotive. It caused each of the four, 1,500-hp units to put out from 1600 to 1625 hp each because of the higher Btu content of the cat cracked fuel. After adjusting the power piston setting and the injector rack to cut the horsepower to between 1510 and 1520, this locomotive performed successfully. Similar modifications were then made to two other four-unit locomotives and a year's test began.

One locomotive operated on the economy fuel and heavy duty (detergent) lube oil, the second on the economy fuel and straight mineral oil with only oxidation inhibitor added, and the third on premium fuel and straight mineral oil. There was no significant difference in the condition of the engines between the three locomotives at the end of the year's service.

These two tests were typical of a group comparing the effects of lube oil and fuel oil in that some of the findings were common between the two and some were in opposition. Another test in the group showed that filter life for not only the fuel oil but for the lube oil is often reduced when using lower grade fuel because the lube oil tends to oxidize more rapidly. Also, tests generally have indicated that economy fuels effect the cleanliness of the engine.

Differences of opinion extend all the way to use of control procedures. Employment of the electron microscope is an example. At one extreme it is used to try to make it tolerable to burn cheaper and cheaper grades of fuel. The other extreme buys the best quality cat cracked fuel obtainable (which would be a high-grade of economy fuel). It uses the microscope primarily to check the stability of the fuel and to predict from its appearance under the microscope how stable it will be in storage and whether any additives used are performing properly.

The importance of the service on what fuel can be tolerated is brought out by one road which has two groups of switchers operating on economy fuels in two different general locations. The first group ran one year without excessive maintenance or other trouble. The second group, running on the same fuel, but in lighter service with more idling time, had difficulty in excessive smoking, sludging, varnish formation on pistons and liners and rings sticking. Power assemblies had to be pulled at three months instead of the usual two years. In some cases this line found that purging the engine with very high grade premium fuel (60 cetane) cleared up some of the troubles.

One thing that must be remembered in mixing different oils is that the mixture will not necessarily have an average of the qualities (except for the physical content like sulphur). On one of the tests, for example, a mixture of half 50 cetane fuel and half 35 cetane fuel gave a blend with a cetane No. of 37. Individual pour points were -20 and -35. That of the mixture was -35. Flash points of 166 deg and 182 deg became 173 deg in the mixture.

The Diesel engine has the fortunate ability to operate on a relatively low-grade fuel at full load where the preponderance of fuel is consumed. It also has the unfortunate characteristic that idling with low grade fuel fouls up the engine.

The natural solution to this pair of characteristics is an arrangement which would feed the engine the high-grade fuel it needs for idling, then switch over to the low grade fuel it could tolerate at heavy load. Such a dual fuel system has been developed, tried to a limited extent on several roads, and to a large extent on the Southern Pacific.

The Southern Pacific test program on low grade fuel generally is of considerable interest and significance to the industry because it was by far the largest scale test of the dual fuel system and because the overall test also included experimentation with low grade fuel in a conventional diesel engine.

Before the SP went to economy type fuel, diesel fuel represented 54.2% of the total cost of its locomotive operation. Since going to economy fuel two years ago, the percentage of freight locomotive operating expense chargeable to fuel has been reduced to 42.5%.

This comparison unfortunately is not perhaps as meaningful as it might be. Part of the relative change could be due to an increase in maintenance cost, possibly caused by using the lower grade fuel. The relative change could also be effected by an increase in the average age of the lines, diesels as maintenance costs go up with age whereas fuel consumption is not significantly effected.

Nevertheless a change of this magnitude in what is the biggest single expense of diesel operation certainly implies that there are large potential savings obtainable from using lower grade fuels.

The territory selected for a test on different types of fuels in both single and dual fuel engines has a steady heavy grade for a long distance followed by a long descent. The run was considered excellent by the road for experimental purposes because of sustained operation at full throttle followed by lengthy idling.

Test Had Two Parts

The overall SP program had two divisions—one to find a lower cost fuel for existing engines, the second to investigate the possibilities of the dual fuel engines. The first fuel was tested in a standard (i.e. single fuel) engine. It was known as X1 and was a 100 per cent distillate product of a waxy nature with a high (55 deg) pour point and a viscosity (72 SSU at 100 deg) about double that of regular distillate. Because of the high viscosity, pour point and sulphur (.90 per cent) a heat exchanger was installed to warm the fuel to 150 deg for injection. The engine both idled and ran satisfactorily on this fuel. The only difficulty was an anticipated one with the fuel filters, which were designed for high grade distillate. A filtration system of greater capacity solved this problem.

The test with X1 fuel was continued for 6 months in two units. During this period each unit consumed about 100,000 gal of fuel (which would be about 50,000 miles based on a typical average of 2 gal per mile). The test showed that a high pour point waxy distillate with twice the normal viscosity could be satisfactorily used in the EMD engine. No direct action was taken on this test because the fuel did not offer any price advantage.

The second fuel tested in a conventional engine was a 100 per cent cat cracked product with the normal characteristics of conventional distillate fuel except that its cetane was lower, about 34. It also had a lower specific gravity and each gallon contained more heat units. As expected this produced a substantial fuel saving in a test between one unit operating on regular fuel and one on X-2 when both units were adjusted to exactly the same horsepower.

The success with the cat cracked fuel led the SP to adopt what is termed an X3 fuel, which is a blend of straight run and cracked products as its principal fuel.

The next step in the program was to consider a dual fuel system to permit the use of a heavy residual type fuel. But before going to the expense of adding the necessary equipment to permit the engine to handle both light and heavy fuels, the SP satisfied itself that the heavy fuel alone could not do the job. The engine on a test unit became fouled in a very short time by idling on the residual type fuel.

The type fuel selected for experimentation with a dual fuel system was designated X-6. Its viscosity was 300 SSU at 100 deg. (about ten times that of regular diesel fuel). When heated to 160 deg by the cooling water, viscosity was about 80 SSU at the injector. The high viscosity was one reason for restricting the residual fuel to heavy duty service.

The second reason was the high (2.5%) sulphur content. This required that condensation problems be avoided by using the fuel only at high engine temperatures where the detrimental effects of the high sulphur content would be at a minimum.

What the SP Learned

Both the single fuel and dual fuel experimentation caused the SP to conclude that fuel research offers an excellent opportunity to reduce railway operating expenses and that locomotive diesel engines will handle without difficulty, particularly at high output, fuels of much less restrictive characteristics than generally thought necessary by railroads, oil companies and manufacturers. The SP also came to the following individual conclusions:

1. Heat exchangers will raise the temperature of high viscosity fuels to 160 deg, which is sufficient for proper injector spray pattern. Fuel temperatures could be raised further if desired by electric immersion heaters or by exhaust heat exchangers.

2. The high sulphur content (from .90% in X 1 fuel to 2.5% in X 6 fuel) did not cause abnormal wear in 6 months' service.

3. The low cetane rating of 35 in X 2 cracked fuel has not caused maintenance or operating difficulties although some cold weather starting problems and idling difficulties will be experienced with low cetane fuels unless engine modifications are made.

4. The greater heat content per gallon of residual fuels will reduce fuel consumption and increase horsepower output. Therefore, the engine setting should be changed to reduce the output back to the original capacity designed into the engine.

5. Cracked fuel should be segregated in storage when possible.

6. Higher capacity fuel filters are desirable on locomotives and more attention should be paid to filter maintenance. Filtration of cracked fuel into and out of stor-

age tanks will help relieve the load on the locomotive filter system.

7. Selected dispersive additives can reduce storage and filtration problems with cracked fuel. Certain metallic type additives may, however, cause excessive spark emission whereas organic or ashless additives do not.

8. Insulation sprayed on the outside surface of the fuel tank is effective in retaining the heat in the fuel.

9. Lube oil with higher than normal additive content appears desirable for engines using cracked fuel. With residual type fuels containing high sulphur, lube oils with high alkaline reserve appear desirable and more frequent oil drain may be necessary.

10. Alternate use of distillate and residual type fuel in the automatic dual fuel system is beneficial in purging the fuel system and reducing the build up of deposits on the injector spray tips.

Perhaps the practical ultimate operating results of the SP dual fuel tests are best summed up by the road's decision to convert locomotives in addition to the first 15 to dual fuels in order to make "fleet tests."

Completing the Cycle

Summing up the fuel situation generally, it appears that in one respect we have reverted back to somewhere near where we were in the early days of the diesel. Fuel specifications then were not very strict. Only when troubles began to appear did specs tighten up. In those days this was an easy and economical solution. The little diesel engine experience of 25 years ago put a premium on anything that reduced troubles. High grade fuels were available in adequate quantities and at a price that kept diesel fuel costs way below that of steam power, the yardstick of that time.

There are three big differences between today's fuel specs and those of 25-30 years ago. Early specs were similar from one road to the next, but, in practice at least, did not control by very much the quality of fuel bought. Today the overall range (from premium to residual) is much wider, but specs for any one of the many types used are much more rigid. The third difference is that the quality demanded is much more dependent on price differential than ever before.

Thus, in completing our cycle on fuel, we have not returned to our starting point by any means. Instead we have progressed. We now know much more about the range of various properties of fuels that will permit them to perform satisfactorily—and what service limits fuel quality may impose. Enough is now known about diesel maintenance to tell pretty accurately what effect a given grade of fuel is having on the parts—although much is yet to be learned about predicting the wear effect of a given fuel either in advance or from a short term test.

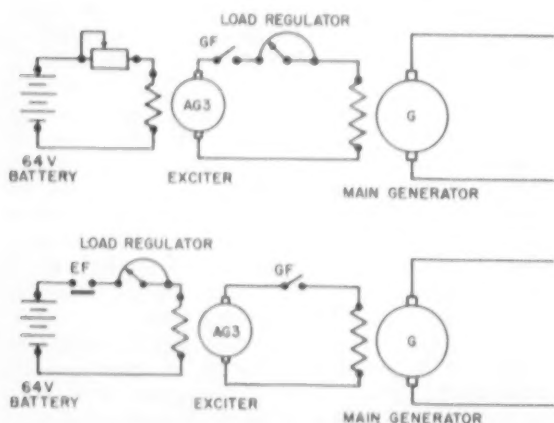
Test techniques yet unknown or largely unexplored in the railroad industry may be needed to get full potential savings from economy fuel programs. Radioactive materials may be the key to accelerated testing of wear rates. Similar advanced procedures may give the badly needed advance test for stability, and some of the other problems that have arisen with economy fuels. Perhaps such new techniques will not only lick our present problems, but open up entirely new horizons for saving money on fuel, which still remains the biggest single item of locomotive expense.



EMD-MU painted on the side of NYC diesels indicates that the unit has standard jumper receptacles and has been wired so that it operates with Electro-Motive units.

SINCE PURCHASING its first diesel road freight locomotive in 1944, the New York Central has constantly increased its fleet to nearly 1,300 road locomotive units. To best meet operating requirements, it should be possible to use any units in combinations of two, three, or four working as one locomotive. Until quite recently, units made by one builder would not operate in multiple with those made by another manufacturer.

This situation has frequently led to difficulties. If a two-



NYC excitation system for Alco passenger units has been a two-stage development. At top is the first modification. Traction motor blower generator could develop sufficient power to excite the GE main generator, but regulating this output through EMD load regulator resulted in overheating of the regulator. Second and final modification below moved load regulation to the exciter field circuit where it is done by a small rheostat built into the Woodward PG governor. Main generator field requires maximum current of 86 amp and voltage in excess of the 74 volts used on EMD locomotives.

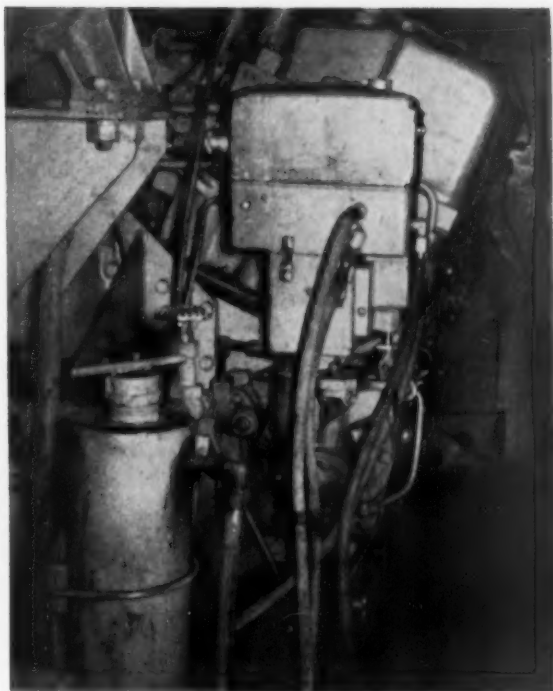
New York Central Mixes Its Own

Alco, Baldwin, EMD and Fairbanks road units operate together, and maintenance is simplified with changes and redesign of control and power circuits

unit EMD passenger locomotive and a two-unit Alco passenger locomotive each arrived at Harmon with one unit that required work, it was impossible to dispatch the two serviceable units since they would not m-u with each other. NYC trains require more power than a single 2,000 or 2,250 hp unit can supply. It was decided that better locomotive utilization would be achieved if all road locomotive units had a universal type of m-u control.

The EMD control circuits became the basic system since the majority of all NYC locomotives were built by Electro-Motive. Most Central units had the necessary eight-step governor control. The changes needed were those of installing standard jumper receptacles, of rewiring the train line circuits to assure similar response of control and alarm functions on each unit, and conversion of sanding control from electric to pneumatic actuation. Little additional equipment was installed. There were a few air-throttle units. These had to be equipped with electro-hydraulic governors, new controllers, and complete train line installations. This program is nearing completion on the passenger fleet and is to extend through all the freight units and finally the road switchers.

The preponderance of General Motors power inevitably caused maintenance men to become most familiar with that control. A decision was made to further increase availability by adopting a standard arrangement for traction and control wiring and components. This would reduce servicing time, and shorten road delays caused by difficulties arising from trying to locate troubles on unfamiliar locomotives. The EMD design has again been the proto-



Above: Electro-hydraulic governor on Alco engine. This was the first locomotive equipped. Oil lines run to the load regulator which has since been abandoned in favor of load regulator in the exciter field circuit. At right: Traction motor blower motor generator has same



external appearance as the amplidyne exciter which it replaces in the top position at the commutator end of the main generator. This GE machine is mounted on the mounting flange without any alterations and is driven through the driving gear.

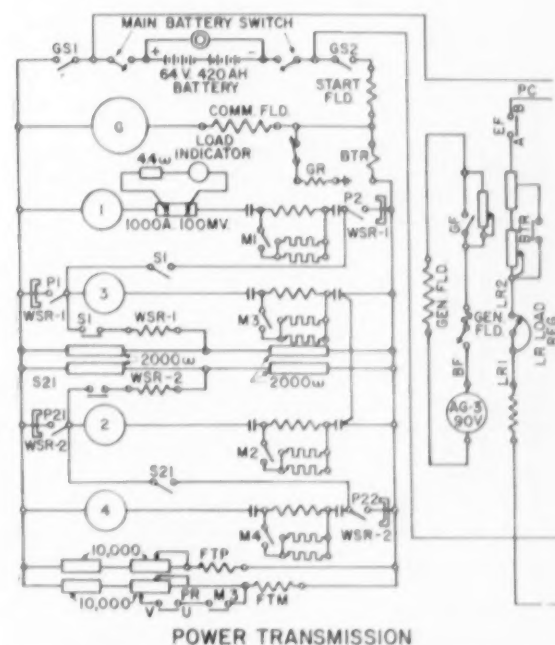
CONTROL CIRCUITS USED IN 27-CABLE JUMPER BETWEEN ALL NYC PASSENGER UNITS

1	N	Negative (Paralleled with 4)
2	SG	Signal
3	DV	D Solenoid in Governor
4	N	Negative (Paralleled with 1)
6	CF	Generator Field
7	CV	C Solenoid in Governor
8	FO	Forward Reverser Control
9	RE	Reverse Reverser Control
10	WS	Wheel Slip
12	BV	B Solenoid in Governor
13	PC	Power Control
15	AV	A Solenoid in Governor
16	FP	Fuel Pump
22	CC	Compressor Control
26	SV	Separator Blow-Down (Steam Generator)
27	RV	Train-Line Cut-Off (Steam Generator)

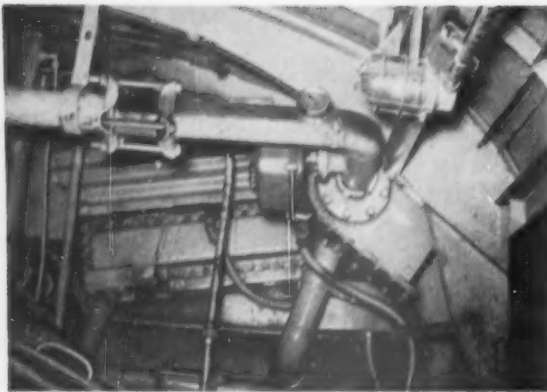
type, although the NYC has retained major components such as generators and motors, altering only their connections and controls. This has produced interesting and workable schemes for Alco, Baldwin, and Fairbanks Morse locomotives using their original electric transmission equipment.

Much of the groundwork was done on the wiring and controls of one Alco-GE passenger B unit. The aim of these modifications was to arrange power transmission circuits to duplicate those on EMD E7 and E8 locomotives, and to duplicate their main generator excitation and load control as far as possible while retaining the original main generator. Control circuits were rearranged so that the unit would not only operate with an EMD unit, but so that the control functions like that on EMD units. This produced a schematic wiring diagram with a completely EMD appearance.

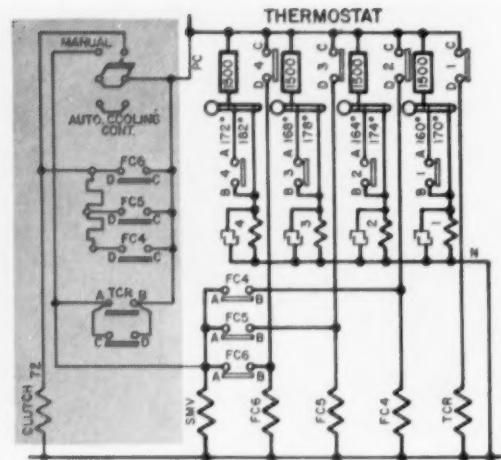
On the first locomotive the original amplidyne exciter was replaced with the same d-c generator which drives the traction motor cooling fan motors. This means that the



Schematic wiring diagram shows the modifications which are becoming standard arrangement for the power transmission of Alco passenger units. Major changes are in excitation, wheel slip, and transition control.



Vernatherm installed in waterline to radiators of Fairbanks-Morse passenger unit controls d-c cooling fans. Wiring diagram (at right) shows the temperature control applied to an Alco passenger unit. Shaded area covers control of the Alco eddy current clutch. Remainder of the diagram shows wiring that is to become universal on Central locomotives.



gear case at the commutator end of the main generator now supports two of these generators along with the original auxiliary generator which powers the control circuits and charges batteries. The original traction motor blower

motor generator still performs its original function. The second GE traction motor blower motor generator serves as the exciter for the main generator. The output of this unit is regulated through an EMD load regulator and delivered to the battery field of the main generator. General Electric main generators require higher excitation currents than are used on the EMD generators. While this exciter is of adequate capacity, the load regulator has proved to be too small. The locomotive has operated satisfactorily with this arrangement, but there is constant overloading of the load regulator.

The arrangement finally adopted as standard is a modification of the original installation. In this the load regulation is handled in the field circuit of the exciter rather than in the field circuit of the main generator. This was accomplished by using the Woodward PG governor with the integral load regulator. This governor is the one that is standard on Fairbanks Morse locomotives. The load regulator controls the field of the exciter (AG3). The traction motor blower generator has proved to be a suitable exciter for its main generator. The redesign has produced a workable excitation system on the Alco-GE units.

The Westinghouse power transmission equipment on Fairbanks Morse and Baldwin locomotives has been changed very little. These units already had hydraulic governors, but they were air actuated. It was necessary to replace the air-actuated multiple unit control with the solenoid type so that the eight-notch EMD controller can operate them.

Two stage field shunting originally used on some locomotives is being replaced by single stage shunting. The traction motor cutout switches are being removed and it will no longer be possible to isolate a single motor. The switches were seldom used and have at times been a stop-gap measure for a failure which could have been corrected after a more thorough inspection. Automatic transition on the Alco passenger locomotives is now accomplished through an EMD F7 control circuit. These same units have through cable wheel slip relays in an arrangement duplicating that on the F3.

Engine temperature control on all types of power will eventually be actuated by vernatherms. The sequence control provided with this thermostat powers d-c contactors on the Baldwin and Fairbanks units to control the d-c radiator fans. On the Alcos the vernatherm circuit actuates

New York Central System Diesel Electric Road Locomotives

Unit Type	ALCO G E		Baldwin, L-H or B-L-H		Electro-Motive Division		Fairbanks Morse	
	A	B	A	B	A	B	A	B
Road Passenger Units								
1945					8	4		
1946								
1947			2x	1x	20x	6x		
1948	4	4	2x	1x	6	6		
1949	4				6		6	
1950	5	1						
1951					12			
1952	2				14		8	
1953					34			
Total	15	5	4	2	100	16	14	
Road Freight Units								
1944					4	4		
1945								
1946					2			
1947	4	2			18	10	2	
1948	29	10	4	2	10	6	1	1
1949	11	11			41	16	3	1
1950							12	3
1951	64	32	8	4	34	7		
1952	16	8	10	4	163	32	8	4
Total	124	63	22	10	272	75	26	9
Road Switchers								
1948	11		2					
1949	7							
1950	27		16		26			
1951	77		17		60		13	
1952	35				39			
1953	15				92			
1954								
1955					21			
Total	172		35		238		13	

*—254 of these units have steam generators for passenger service.
x—All Baldwin passenger units and six EMD passenger units are classed as combination units.

shunting contactors which regulate current flow in the eddy current clutch.

The passenger locomotive rewiring is nearly complete. Basic design differences in the dynamic braking of Electro-

Motive and Alco freight units is an unsolved problem which will delay standardization of freight power. The final phase of the program will standardize the road switchers.

Russia Looks to Electrification

No steam locomotives are to be built after 1957 — Electric locomotives to handle heaviest traffic with diesels and gas turbines for other lines

The Russian railways have work in progress and are making plans for the immediate future which will entail electrification of heavy traffic lines, extension of the use of diesels, the trial of gas-turbine and gas-producer locomotives and discontinuance of the manufacture of steam locomotives by 1957. What the USSR is doing to improve its railroad motive power is outlined in a report by A. Seredin, who bears the title of Chief Engineer in the main office for railroading. According to Mr. Seredin the need for replacing types of steam power has been felt for a long time, but diesel and electric locomotives have been introduced only slowly. The need for better power is particularly acute in the cold districts. Daily average mileage of locomotives are reported as 370 and it is expected that diesel and electric locomotives will be able to increase these mileages without double heading. It is expected that new motive power will increase traffic capacity of some lines by one and one-half to two and one-half times and that fuel, water and maintenance costs will be greatly reduced.

The cost of converting from steam to electric power costs are estimated as \$230,000 per mile of double-track while conversion to diesel operation is given as \$20,000 per mile. Diesel locomotives for switching even in electrified zones are recommended, their availability being given as 95 per cent with ten day periods between inspections.

In addition to a plant at Kharkov, the locomotive manufacturing plants at Woroschilowgrad, Kolomna and Brjansk will be engaged in building diesel locomotives. Other plants will make parts. The construction of steam locomotives will be completely discontinued in 1957. A plant at Nowotscherkassk will be expanded for the production of electric locomotives.

Construction of the type TE-2 diesel locomotive now in service has been discontinued and it will be replaced by a type TE-3 later this year. The TE-3 employs a 10-cylinder, 2-cycle engine rated 2,000 hp. It has a maximum speed of 62 mph in freight service, and with different gearing, 75 mph in passenger service. It is also planned to increase the horsepower output of the TE-3 to 3,000 by supercharging and increasing the number of cylinders from 10 to 12. A 10-pole generator without compensation winding used with field shunting of traction motors is in process. There will also be switching locomotives of 400, 700 and 800 hp with hydro-mechanical transmission. Work is being continued on gas generator diesel locomotives, a test series of which is already in operation. Mr. Seredin also refers to work being done on the creation of a gas turbine locomotive with electric transmission. A thermal efficiency of 12 to 18 per cent is anticipated.

Electrified lines are now using a type UL-22M electric locomotive rated at 3,200 hp. Its maximum speed is only 47 mph and construction has been started on a 5,700-hp electric locomotive. It has 8 driving axles and a top speed of 56 mph. The locomotive plant is designing a passenger locomotive to operate at speeds up to 100 mph.

The use of direct current at 3,000 volts for electrification is considered questionable because of its large requirement of non-ferrous metal. High voltage a-c at commercial frequencies is being considered as a substitute for 3,000 volts d-c.

Under a 5-year plan, Mr. Seredin states that rolling stock for commuter traffic will also be improved. The Riga plant built experimental three car m-u units in 1955 which attained speeds of 80 mph as compared with the customary 53 mph. However, Mr. Seredin adds the motor car train still has a number of defects. Its weight is too high and its acceleration inadequate. The plant, he says, must still do further work in perfecting the motor cars.

New Types for Growing Traffic Needs

A particular point made by Mr. Seredin is that when steam operation was being replaced abroad by diesel and electric traction, the amount of traffic on the railway lines was already stable or declining there. In the Soviet Union, however, the new types of traction are being installed while there is a constant increase in freight traffic. This fact, he says, requires more decisive and rapid action and considerably complicates the work. This is followed by an appeal to the workers.

For diesel and electric locomotives Mr. Seredin says there must be shops and departments which do not exist on steam operated lines. All of these departments must be newly established and new facilities must be built. A list of the required facilities, approximately duplicating those used in American shops is included in the report. Mr. Seredin states that our experience in converting from steam locomotive operation to diesel or electric traction shows that one of the main obstacles in this field is always that the repair work shops and the rigging-up places have not been sufficiently prepared for the new operation. He also says that it is particularly important to provide in advance for the training of enginemen, mechanics, foremen, engineers and technicians. This, he says, is the most important goal of the work in manufacturing shops and on the railroads.

Mr. Seredin concludes by saying that the introduction of diesel and electric locomotives is a great technological event in the history of Soviet railroading.

Amps to Ground

The ground relay is an important device, but not many agree on how it should be used

We published the following question in the February issue of *Railway Locomotives and Cars*.

What is the maximum leakage current in amperes that can be tolerated on a diesel electric locomotive (a) main generator or high voltage circuit, (b) control (75-volt) or low voltage circuit, and what is the best way to measure this current leakage at the maintenance shop level?

The replies which appear on this and the next two pages were received in response. If you have some other opinions of your own on this subject, please let us know what they are.

Slight Moisture Should Not Trip Ground Relay

The maximum leakage current in amperes that can be tolerated on the high voltage circuit of a diesel-electric locomotive depends on the tripping value of the ground protective relay. Formerly this value on some types of locomotive was too low to permit normal required operation. In other words, fine snow, mist, or heavy fog would allow sufficient current flow through the insulation to trip the ground relay rendering the locomotive inoperative. The C&NW pioneered increasing the tripping value to 500 ma and the results were improved to such an extent that it was recognized by the builders who later made 500 ma basic. I understand that tests are being conducted to ascertain whether it might be advisable to further increase this value to 750 ma.

In direct answer to your question *A*, we use 1 megohm as minimum reading on high voltage insulation as read on a 500-volt megohmmeter. However, I have waived this rule under certain conditions when we were short on power and when I was reasonably sure that the moisture would dry up under operation.

Regarding question *B* which asks what is maximum leakage current in amperes that can be tolerated in control (75 volt) low voltage circuit, the low voltage system is also held to 1 megohm minimum on locomotives undergoing heavy repairs. This is also measured with a 500-volt megohmmeter. However, we use a different system for checking locomotives in service. We measure voltage from positive to ground and from negative to ground with an instrument having 200 ohms per volt. Any reading of less than 20 volts is tolerated. It is a very difficult matter to keep the low voltage system clear of grounds due to the lead-acid battery usually having acid on the outer surface of the trays.

L. E. LEGG
Electrical Engineer
Chicago and North Western

The Reasons for Varying Recommendations

This question of leakage current to ground is a very ticklish one to answer as the various manufacturers of locomotive electrical equipment do not agree on the subject. This is borne out by the fact that their method of connecting the ground relays in the high voltage circuits and the values at which they trip out are very far apart.

For example, Westinghouse uses the Wheatstone bridge principle of connecting the relay to the circuit or connects the trip coil to the mid point of a resistor which is across the main generator terminals, so that should a ground occur on either the positive or negative side of the system, it would trip the relay. The disadvantage of this system is that if a ground of equal resistance should occur on both the positive and negative sides of the system at the same time, the bridge would be balanced and the relay would not trip. This balanced condition is likely to occur during a flash over of the main generator when the ground relay is most needed.

Electro-Motive uses a similar hookup to that of Westinghouse. Connecting between the junction of the main generator shunt field and the shunt field resistor and the ground sets up an unbalanced bridge connection to start with. This unbalanced circuit is more sensitive to positive than to negative grounds.

General Electric connects the ground relay direct to the negative generator lead and thus gives no protection to negative grounds.

The following table shows the amount of leakage current to ground through the ground relay required to trip the different relays and the resistance of such a ground required to pass this amount of current:

	AMPS REQUIRED TO TRIP GROUND RELAY	RESISTANCE OF GROUND IN OHMS REQUIRED TO ALLOW ENOUGH CURRENT TO FLOW TO TRIP RELAY:	
		Plus Side	Negative Side
Westinghouse	.060	7300	7300
E.M.D. Type DDG	.110	5860	3170
"	.277 .200	3200	1730
"	.277 .300	2120	1140
"	.277 .500	1270	700
General Electric	.056	17216	—

We have established a practice of not allowing grounds on locomotive high voltage system of less than one megohm, which means the leakage current for 1000 volts at generator terminals would not be more than .001 amp on the General Electric system and approximately half of that on the others.

This might appear to be a greater factor of safety than necessary, but we have found in actual practice that if you allow the resistance to become less than one

megohm, ground relay action and flashovers are apt to occur too often.

As far as low voltage systems are concerned, it is hard to keep them much above 1000 ohms due to washing and flushing the batteries. However, if the resistance is not kept high, ground relays will trip during the engine cranking period when both systems are connected together.

R. M. SPENCER

Ground Relay Is an Essential Safety Device

The main generator, traction motors, and all wiring of the high voltage circuits should be maintained at a minimum Megger reading of one megohm to ground, using a 1000-volt Megger. This will indicate a leakage of about .001 amperes because of the fact that the ground relay completes the circuit as a return to the main generator.

As the Megger reading drops below one megohm, the pick-up value of the ground relay may be reached which may cause delays or a locomotive failure.

If the ground relay were not in the circuit, a low Megger reading, due to a single insulation breakdown, would not mean there was a current flow since there would be no path of return.

It is very important that the ground relay be kept in the circuit as a safety measure. Without the protection of the ground relay there could be a complete breakdown of insulation without warning and the locomotive frame would become one side of the power circuit. Under these circumstances, locomotive crews, while operating the locomotive under power, would be in a very dangerous position should they by accident come in contact with any part of the high voltage equipment.

The 75-volt control circuit should be maintained at a no-voltage to ground reading. It is necessary to check the auxiliary generator voltage at certain intervals and while making this check it is very easy to check voltage to ground on both negative and positive sides.

Any voltage reading to ground, if on one side only, will not cause a leakage in amperes since the control circuits have no connections to ground but there is always the chance of a second ground of opposite polarity which will of course cause a leakage and which may develop into a short circuit.

It would be well to note here that the ground relay often comes in while starting the engine when there is a near full-voltage ground on the control circuits.

If a voltmeter reading shows a control ground, an ohmmeter can be used to determine what the reading is in ohms. Knowing the voltage of the ohmmeter and finding the reading in ohms, I equals E/R .

Do not use the ohmmeter on the circuits between the battery and the battery switch unless the positive and negative leads have been removed from the battery, the ohmmeter could be damaged by battery voltage, also do not use the ohmmeter on the control circuits unless the battery switch is out and the engine shut down.

To sum up for both power circuits and control. We should maintain one megohm or better to ground on the power circuits and we need not be concerned about leakage in amperes. We should keep control circuits with a

no-voltage to ground reading and there will be no leakage in amperes.

W. E. ABBOTT

Let's Be Sure of What We Want

I suggest that a direct-current reading using the voltmeter-ammeter method of measuring insulation resistance to ground would mean more and indicate more to the average diesel electric locomotive maintenance electrician than the present use of Meggers, hypot machines and what have you.

First, let us examine why we wish to keep the ground leakage current under control. Is it because of the power losses involved? I don't think so. Isn't it rather that because we do not wish to deteriorate the existing insulation?

Another question—how much can we afford to pay to keep the existing insulation of traction equipment in the same condition in which it was built? Should we not strive to maintain the equipment so that we will get the most economical service life from mechanical and electrical parts? Then when the weakest part of the assembly requires replacement, generally bearings, all component parts can be reconditioned for another operating cycle.

Another question—what parts of the rotating electrical equipment can be given increased dielectric strength without disassembling the rotating element from the stator? Aren't we limited to those creepage surfaces at the commutator and brushholders that are accessible to cleaning and reinsulating?

When all accessible creepage surfaces are clean and well insulated and a motor or generator reads less than an acceptable dielectric value what can we do but disassemble the machine. If anyone can upgrade the insulation without machine disassembly I would like to discuss the details with him across the luncheon table and I will pick up the check.

This brings us to the point of determining a *GO-NO GO* point for insulation resistance.

I suggest that it is economical to operate a nominal 600-volt motor or generator with a leakage current which if concentrated in one path would cause a light track that could be removed by a mild abrasive, such as sanding of string bands. This would apply to diesel electric locomotives built in the past fifteen years and having the quality of insulation of this period. Incomplete investigation and discussion over the past several years indicates that *15 ma at 1,500 volts direct current* will not cause seriously destructive tracking.

Following the same reasoning, I suggest that the low voltage system can be safely operated up to a leakage of *300 ma at 75 volts direct current*.

Using the above values for a *GO-NO GO* gauge presupposes that the equipment in the circuit has been cleaned as much as is reasonably possible both by blowing out, and by using other cleaning methods on the creepage surfaces which are available to maintenance forces.

Since most paths to ground on diesel traction equipment are inaccessible to maintenance or are through solid insulation I suggest that the cleaning of the string-band and other creepage surfaces which are available for maintenance is about as much as is warranted by

the labor expense required, until the machine is removed from the locomotive for overhaul.

It is generally accepted as good practice to make periodic insulation resistance tests and to record the readings over the life of the machine. This practice is well substantiated by technical papers published by insulation experts in the industry. It is also recognized that the insulation will deteriorate progressively with age and that it is not alarming if the insulation resistance shows a steady drop. It is alarming if the rate of deterioration of the insulation resistance as indicated by the ground test shows an appreciable increase over the rate of previous readings. This is generally accepted as being an indication that the machine should be re-insulated. It is also well recognized that for comparison purposes, insulation test readings must be made at equal time intervals if the comparison of the ratings is to be of appreciable value. It is common railroad practice to take the readings for one minute duration because that is required by law for the annual inspection. Researchers, however, have used one, five, ten-minute and longer periods of time when getting more detailed checks on insulation. I would suggest that the potential of the test be limited to not more than one and a half times the maximum operating voltage to prevent setting up unnecessary stresses within the equipment.

Potential may be provided for direct current testing either by the use of a transformer with the primary connected to the shop lighting circuits and the output of the transformer rectified or by a direct current mg set. The latter is presently available in most diesel maintenance shops and is used for testing and setting transition and other relays. It may also be used for the ground test with the addition of two meters, one a 1500-voltmeter and one a milliammeter with a scale reading that will accommodate the maximum tolerated reading to be used. Meters of these ranges are also available in most diesel maintenance shops as they are required for other work. The transformer-rectifier combination using a Variac for control of potential is relatively cheap to construct. A number of shops have already made testing instruments of this type. These testers can also be used for applying the annual high potential test required by the ICC. Either of these test sets are appreciably cheaper than the a-c testing outfits commonly used around railroad shops and in addition the d-c test set gives readable information that cannot be obtained conveniently from the a-c test sets.

For testing a low-voltage, 75-volt, control circuit I suggest the use of a voltmeter with the characteristics that would require 300 ma for full scale deflection. Then a direct reading to ground will indicate the current flow. A number of shops are doing essentially the same thing by testing to ground with a 75-volt, 50-watt rough service lamp. If the glow of the filament of the lamp cannot be observed the circuit is considered to be sufficiently clear of grounds for operation. A meter type tester would be much more convenient and it is my opinion that one could easily be constructed as a pocket instrument, modeled after the pocket instrument of any of the major meter manufacturers. It would only require the use of a voltmeter suitably shunted to give the desired milliamper flow for full scale deflection.

C. W. MARTIN
Assistant Engineer Diesel Electric
Baltimore and Ohio



A Wheatstone Bridge tells the exact number of strands broken in any circuit in a jumper cable

Tests Number of Bad Strands in Jumper Cable

THE C&EI TESTS diesel unit jumper cables with a Wheatstone Bridge to give an accurate picture of just how many strands are broken. While the method employed is somewhat slower (actual test time is about 10 minutes per cable) than a special test panel, and it does not test resistance to ground, the C&EI prefers this method because—with the aid of a calibration table—the exact number of broken strands can be determined rather than merely whether the cable is broken completely or not.

This feature is considered important because cables can pass a test for conductivity with only a few sound strands; yet these few strands would not be strong enough to stand a trip and the entire cable would fail.

The procedure is simple, using a pair of leads with a plug on one end of each wire and a flat clip on the other end. The cable is supported by a stand in a vise as shown in one of the illustrations. The flat connector ends of the leads are connected to the two terminals of a Wheatstone Bridge while the plug ends are first inserted in the No. 1 holes of the jumper cable, then the No. 2 holes, and so on until all circuits are tested. With a pair of leads having a resistance of .0018 ohms each, the C&EI has found that the following readings (part of a complete list showing the resistance that would indicate anywhere from 0 to 59 broken strands) on the meter indicate the following number of broken strands (these figures were developed by breaking one strand at a time in a test cable):

Resistance In Ohms	Number of Broken Strands	Resistance In Ohms	Number of Broken Strands
.034	5	.070	50
.035	10	.095	56
.038	21	.108	57
.044	30	.128	59
.054	40		

Don't Cut Corners

By Gordon Taylor

1. A passenger diesel locomotive on one of our best trains stopped at a station. One of our diesel supervisors happened to be passing along the station platform, when he smelled what he thought was scorched wool. There was no smoke. He made a quick inspection and found a hot motor suspension bearing. He removed the wick lubricator and found it badly scorched, but with plenty of oil in the oil reservoir. A new wick assembly was applied and the train departed with very little delay.

A test of the old wick assembly showed that the tension spring that holds the wick against the journal was very weak. Someone had cut a corner and failed to try the lubricator wick spring when it was last applied. Fortunately, a man with a nose for trouble happened along at the right moment, avoiding what could have been a very bad failure.

2. An Alco freight diesel was being supplied water for the cooling system when the foreman called the water supply man to hurry to another job. In his hurry to get to the other job, the man failed to close the drain valve in the engine room of the unit.

He simply removed the water hose from the diesel and the water started draining out of the engine cooling system. The unit left town draining water, and in a short time had to be shut down. Tonnage was reduced and the train delayed. In my record, it is another case of cutting corners.

3. A two-unit freight locomotive was being prepared for service. The electrician made a number of tests and, for some reason, had removed the jumper cable.

When the unit was moved to the train yard, the crew discovered that they did not have enough power to start the train. An inspection revealed that the second unit was not loading because the jumper cable was not connected to the trailing unit. The cable was simply hanging in the passageway. About 10 minutes was lost in restoring service, and a second train was also delayed waiting for the first train to clear the way.

Again, a case of cutting corners.

4. Not too long ago, we had a case in which a failure occurred when a maintainer failed to lubricate the traction motor pinion and axle gear. The maintainer meant well, but he just cut a corner and a failure resulted.

5. There have been two recent instances in which pig-tails or brush shunts have not been properly fastened on the brush holders of main generators. In both cases, the brushes were those located next to the commutator risers. Apparently, the maintainer did not give the brushes the attention they deserve. Applying brushes to a generator is such a simple job that maintainers are apt not to attach sufficient importance to checking to

This series of articles is based on actual experiences of men who operate and maintain diesel-electric locomotives.



If you don't touch the base, you don't score.

see that brush shunts are securely fastened and in the clear.

6. An EMD freight diesel unit arrived at one of the run-through terminals with engine shut down because of continued ground relay actions. The ground relay would trip each time that the throttle was brought to notches No. 1 or No. 2.

After re-setting the ground relay several times, the crew finally shut the engine down.

The maintainers made a careful inspection to determine the source of trouble, but could find no visible evidence of cause. A check with a megger tester disclosed zero ground on the main generator circuit.

The maintainers were about to send the unit on to its home maintenance point when it was decided to make a final check to be certain that nothing had been overlooked.

The cabinet door was opened at the control panel, where the main battery switch is located, and a flashlight was shined down in the bottom of the cabinet. It was seen that the control air pressure gage was lying across the bus bar that runs from BTP relay to the main generator cable connection and the steel supporting bracket, causing a zero ground. Removal of the gage gave a megger reading of 22 megohms. The gage was restored to its proper position and the diesel was dispatched in service.

It is believed that the control air gage had been removed for some purpose and being connected to a rubber hose had been layed down in the bottom of the cabinet. Two screws and three nuts of the proper size for mounting the gage were found in the channel behind the gage mounting bracket. Someone apparently got in a hurry and didn't finish the job.

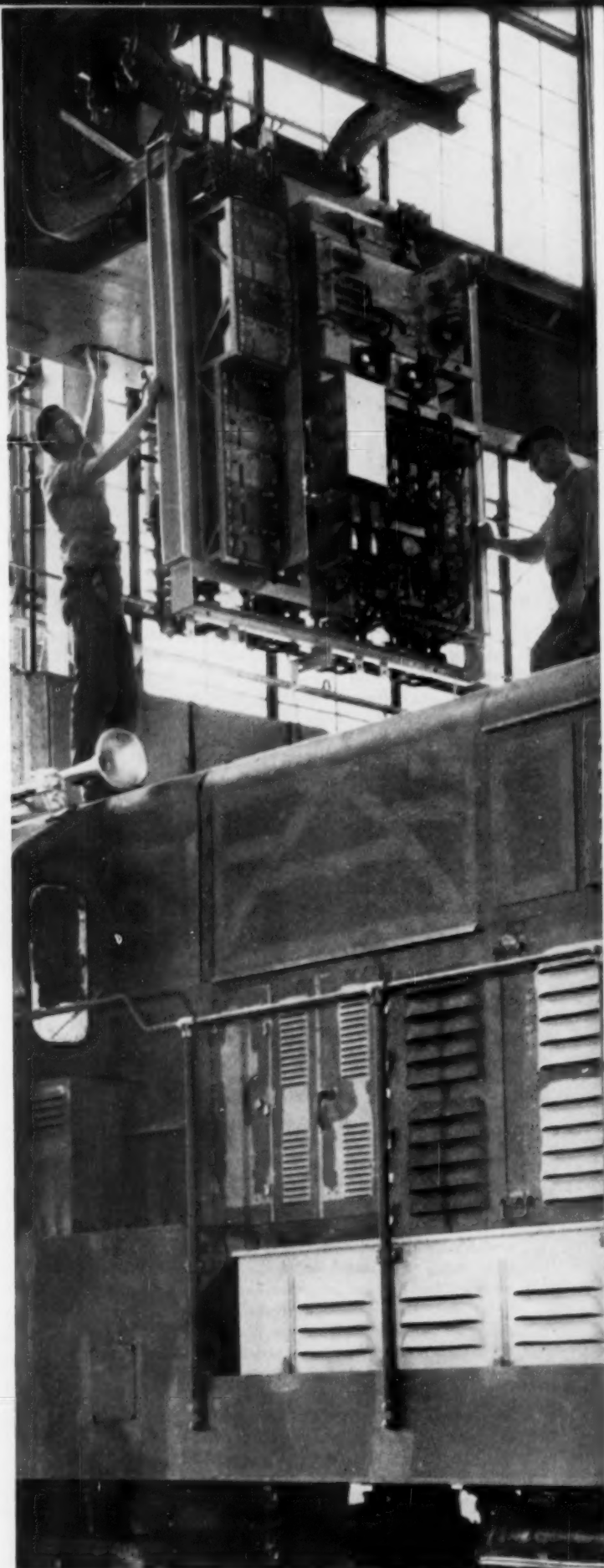
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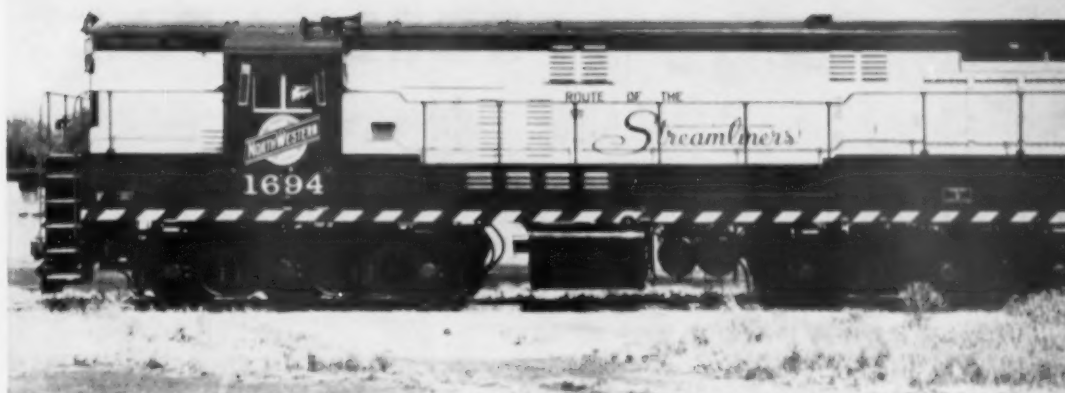
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PROBLEM PAGE . . .



WHERE THE TOUGH ONES ARE HANDLED

A new question this month. Remember that it pays you to share your ideas and experiences with our readers. Submit letters to the Problem Page Editor.

With the first service feature cut out on a 24-RL brake pedestal, what would cause a loss of 5 or 6 psi pressure in the equalizing reservoir when the automatic brake valve handle is moved to the first service position? This is not normal, and the first service cut-out cock assembly was cleaned and checked, but did not solve the problem.

Do Diesels Start Fires?

Can the responsibility for track-side fires ever be laid to diesel-electric locomotives?

MANUFACTURER'S EXPERIENCE, by *Electro Motive Division*. A track-side fire actually traceable to diesel origin is so rare that the matter has not occasioned much accumulation of data nor study here, although our engineers have given it some thought. The railroads that use spark arresters on diesels are so few that we keep no cumulative records on such orders. Our engineers gave the following opinions, based upon hypothetical situations, not having had sufficient reports of actual fires to constitute really substantial data:

The diesel engine, when properly operated, emits such small incandescent particles that they disappear as they rise in the air. But, there are a few conditions which could tend to promote exhaust of a little larger particles that, under some rare "ideal" conditions might ignite extremely combustible material near the tracks. These are: (1) *Prolonged* idling followed by immediate full load operation; (2) Low water jacket temperatures; (3) Water leaks in the cylinder head gasket area; (4) Bad fuel injectors; (5) Diesel fuel additive containing ash; (6) Properties of the lubricating oil ash.

The exhaust valve and muffler condition would contribute to excessive sparking, but the air box conditions would not be directly involved, other than as an indication of poor combustion. The service the locomotive is in does not appear to have any particular significance in this connection.

US FOREST SERVICE EXPERIENCE, from *Fire Control Notes of the Forest Service, US Department of Agriculture*. "It is found that most, if not all, of the brake shoe fires occur on down grades. The "tight" schedule under which the trains operate, the large tonnage of both the passenger and freight trains, and the excessive grades (up to 2.3 per cent) necessitate heavy braking to slow down for the many curves in the canyons, or to stop when it is necessary to "pull" into a siding. This heavy braking causes . . . the wheels and shoes of [cars] to become so overheated that red-hot material, weighing as much as two or three pounds, sloughs off. Many specimens of brake shoe, tire and wheel scale have been found at the point

of origin of a fire, in some instances as far as 16 feet from the outside rail. The fusion of this scale, which could occur only when the metal was so hot that it would "run," forces us to believe that numerous fires have been caused by this hot material. Removal of all inflammable material for a safe distance from the track will eliminate this type of fire."

"Other equipment failures are usually negligible, although one train with a hot box made 175 sets (reported as one fire) in less than an hour."

"Diesels which have a dynamic braking system were used in considerable numbers, lowering brake shoe fires."

"There is definite evidence that diesel locomotives do set fires. During the period April 7 to July 11, 1951, diesel locomotives set 33 fires along the [railroad's] right-of-way, according to information from the [Forest Service]. In addition, a comparable number of fires were set on the state protective area."

"Investigation of these fires, and contact with railroad officials established the following facts:

1. More than one locomotive was involved—two, at least, and possibly four.
2. All fires were started on the east-bound run while the locomotives were laboring on an up-grade.
3. The railroad officials accepted without question the theory that the fires started from sparks.
4. In previous seasons, these same locomotives had not been known to have set fires.

"What was wrong? The railroad company was concerned. The one thing they knew about was that a different type of lubricating oil—highly detergent—was being used. A mechanical engineer and an oil company expert were called in for consultation. The fire-setting locomotives were given a complete overhaul, and a different type of lubricating oil was used. The locomotives went back into service. No fires have been reported since. The explanation in this case would seem to be that the detergent oil was doing exactly what it was intended to do—loosen carbon. When the locomotives encountered a steep grade, pieces of carbon broke loose and were emitted from the stacks." (These are four quotations from *Fire Control Notes* for September, 1937; April, 1941; April, 1953; and October, 1952. The major concern, and the subject most frequently dealt with until recently, has been fires started by sparks from steam locomotives—Editor.)

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General Motors

Diesel-Electric Locomotives

This series of Questions and Answers pertains to General Motors diesel-electric locomotives. The references to manual and page numbers in the text indicate where the original material may be found in the builder's technical publications or instruction manuals. These are usually available to authorized employees on each railroad.

G477-Q—What must be done if any manually operated FT, F2, F3 or F7 unit is in the locomotive consist?

A—The engineman must move transition lever to the proper position in order to effect transition in the unit or units being operated manually.

(Slowing Down Because of a Grade)

G478-Q—When slowing down, how does automatic transition function?

A—Backward transition will take place automatically.

(Manual 2310, Page 213)

G479-Q—What is the indication when a train slows down on a grade?

A—The pointer on the indicating meter will move slowly toward the right.

G480-Q—What must be done if any unit in the consist is operating in manual transition?

A—The transition lever must be moved from one position to another, corresponding to the speeds shown (On page 219 Manual 2310).

(Operating in Short Time Overload Zone)

G481-Q—Why are the traction motors of F7 locomotives (equipped with 65:12 or 62:15 gearing) almost self-protected in most cases?

A—In most cases the gearing allows operation up to the point of wheel slip before entering the range of short time restrictions.

G482-Q—What shows the permissible time of operation at different stages of overload?

A—A plate mounted below the meter dial (Fig. 1-2).

G483-Q—Is it permissible to operate the full time of each rating consecutively?

A—Yes, consecutively or in any combination.

G484-Q—What may be the travel of the pointer of the load indicating meter when starting a train?

A—It may go beyond the continuous rating of 825 amperes.

G485-Q—Is the travel of any concern?

A—No, provided the pointer soon moves to the left of the continuous rating.

Braking

Air Braking With Power

(Manual 2310, page 215)

G486-Q—What is the relation of draw bar pull to train speed when braking under power, for any given throttle position?

A—The draw bar pull increases as the train speed decreases when braking under power.

G487-Q—What may result from this increased draw bar pull?

A—Train parting.

G488-Q—What must be done to prevent train parting under such conditions?

A—The throttle must be reduced as the train speed drops.

G489-Q—How can the engineman maintain a constant pull on the train during a slow down?

A—By keeping a steady amperage on the load meter.

G490-Q—How is this accomplished?

A—The pull of the locomotive is indicated by the amperage on the load meter.

G491-Q—How is this accomplished?

A—This is accomplished by reducing the throttle a notch whenever the amperage starts to increase.

G492-Q—What is recommended in connection with the independent brake during power braking?

A—It is recommended that the independent brakes be kept fully released during power braking.

G493-Q—What must be done before the locomotive comes to a stop?

A—The throttle must be in IDLE before the locomotive comes to a stop.

Dynamic Brake Operation

G494-Q—Can the momentum of the train be utilized for a useful purpose?

A—Yes.

G495-Q—Explain this further.

A—Some locomotives are provided with additional electrical equipment permitting a portion of the power developed by the momentum of the train to be converted into an effective negative power.

Fairbanks-Morse

Diesel-Electric Locomotives

This series of Questions and Answers pertains to Fairbanks-Morse diesel-electric locomotives. The references to manual and page numbers indicate where the original material may be found in the builder's technical publications or instruction manuals. These are usually available to authorized employees on each railroad.

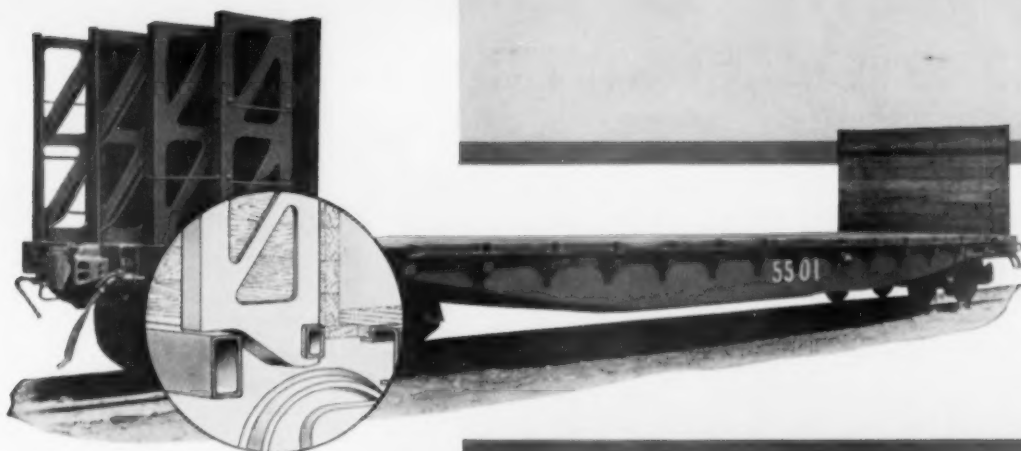
F419-Q—What should be the positions of the selector handle?

A—Leading Unit, Position 4. Trailing Unit, OFF.

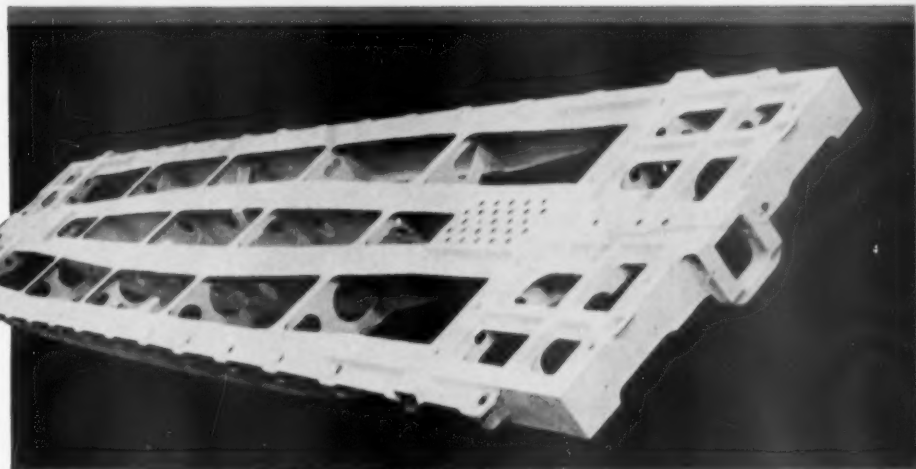
F420-Q—What should be the position of Reverse handle?

A—Leading Unit, OFF. Trailing A unit removed completely.

(Continued on page 86)



50-ton, 53' 6" bulkhead car with Commonwealth one-piece cast steel underframe and interlocking cast steel ends.



Cast steel flat car underframe designed for application of upright ends.

GET *Versatility*

with this Commonwealth Underframe
designed for **FLAT CARS**

BULKHEAD CARS

PIGGY-BACK CARS

Standard Commonwealth one-piece cast steel flat car underframes are especially designed to provide the *extra strength* required when cars are equipped with end bulkheads. The end construction simplifies application of strong cast steel interlocking ends permit-

ting maximum floor space for lading.

Thousands of flat cars with Commonwealth underframes have been in service for many years, proving their exceptionally long maintenance-free life and the *sound economy* of the investment they represent.

Plan wisely for the future — invest in Commonwealth one-piece underframes



GENERAL STEEL CASTINGS

GRANITE CITY, ILL.

EDDYSTONE, PA.

QUESTIONS and ANSWERS

F421-Q—How should the Rotair Valve be placed?

A—Leading Unit—Passenger or Freight. Trailing A Unit—Passenger LAP or Freight LAP.

F422-Q—What should be the position of the controlled emergency cock (control valve, B unit)?

A—Set same as rotair valve on leading unit.

F423-Q—What should be the position of the automatic brake valve?

A—Cut-out on trailing A unit. Cut in on leading unit. The valve on B unit must be sealed in release.

F424-Q—How should the control breaker on the engine switch panel be positioned?

A—ON on Leading Unit. OFF on all others.

F425-Q—How should the fuel pump breaker be placed?

A—ON for Leading Unit. OFF on other Units.

F426-Q—What should be the position of the generator field breaker?

A—Lead unit, ON. Other units, OFF.

Cabinet Breaker Panel

F427-Q—How should the alternator field breaker be positioned?

A—Lead Unit, ON. Trailing A Unit, ON. B Unit, ON.

F428-Q—What should be the position of the locomotive lights breaker?

A—ON on all units.

F429-Q—What should be the position of the heater and defroster breaker?

A—ON on leading and trailing A units.

F430-Q—How should the control cut-out breaker be positioned?

A—ON on all Units.

F431-Q—If the dynamic breaker is used, what should be its position?

A—Lead unit, ON. Trailing unit, OFF.

F432-Q—If the electro-pneumatic brake breaker is used, how should it be positioned?

A—Lead unit, ON. Trailing unit, OFF.

F433-Q—If the train control breaker is used, how must it be placed?

A—Leading Unit, ON. Trailing Unit, OFF.

F434-Q—What should be the control air pressure?

A—80 psi. on all units.

F435-Q—How should the battery ammeter read?

A—CHARGE on all units.

F436-Q—How should the traction motor cut-out switch be positioned?

A—Should be positioned as desired.

F437-Q—What should be the position of the ground relay cut-out switch?

A—On all units, Sealed ON.

F438-Q—How should the dynamic brake unit switch be set?
A—On lead unit and trailing A unit, set for number of units in locomotive.

To Start Engine and Put On Line.

Bulletin 1705, Sec. 104-A, Page 3.

F439-Q—What should be done preparatory to this operation?

A—1-Check breakers and switches for correct position on each unit.

6-SL Brake Equipment

This series of Questions and Answers pertains to the 6-SL air brake equipment for switching locomotives. The references to the pamphlet, page and part numbers in the text indicates where the original material may be found in the manufacturer's technical publications and instruction pamphlets. Authorized persons may obtain a copy of Instruction Pamphlet Number 5046-15 which deals with this equipment by applying to the nearest district office of the Westinghouse Air Brake Company.

W124-Q—What happens when valve 24 is unseated?

A—Brake pipe air flows through the open exhaust port and greatly increases the rate of brake pipe reduction.

W125-Q—Describe the action further.

A—The added pressure differential across the piston creates the force necessary to cause the lower shoulders on pins 9a to pick and unseat exhaust valve 21. Thus the vent valve responds to the comparatively light differential required to lift a valve of small diameter but almost instantly develops a large venting capacity.

W126-Q—What is the exhaust capacity of the two valves?

A—When fully open, these two valves provide an exhaust capacity equal to the internal diameters of a standard 1 1/4" pipe.

W127-Q—What brings about closure of the brake pipe exhaust?

A—Piston 9 is limited in its travel by a stop boss on the lower face of the housing. Stabilizing ports a and b allow chamber C to bleed down until spring 20 and the weight of the operating parts can move both exhaust valves to their seats, closing the outlet to the brake pipe and permitting it to be recharged when desired.

Operation of the Equipment Release and Running Positions

(Inst. 5046-15, Page 35)

W128-Q—How can the functions of charging and releasing the brakes be accomplished?

A—By using both release and running positions of the brake valve, or running position only.

W129-Q—What device can be provided to prevent the use of release position?

A—A device called the full release nullifier is provided for this purpose.

W130-Q—What precaution must be taken in regards to the use of this device?

A—It must be removed if operating rules require the use of release position.

W131-Q—What is the advantage of using running instead of release position for releasing train brakes?

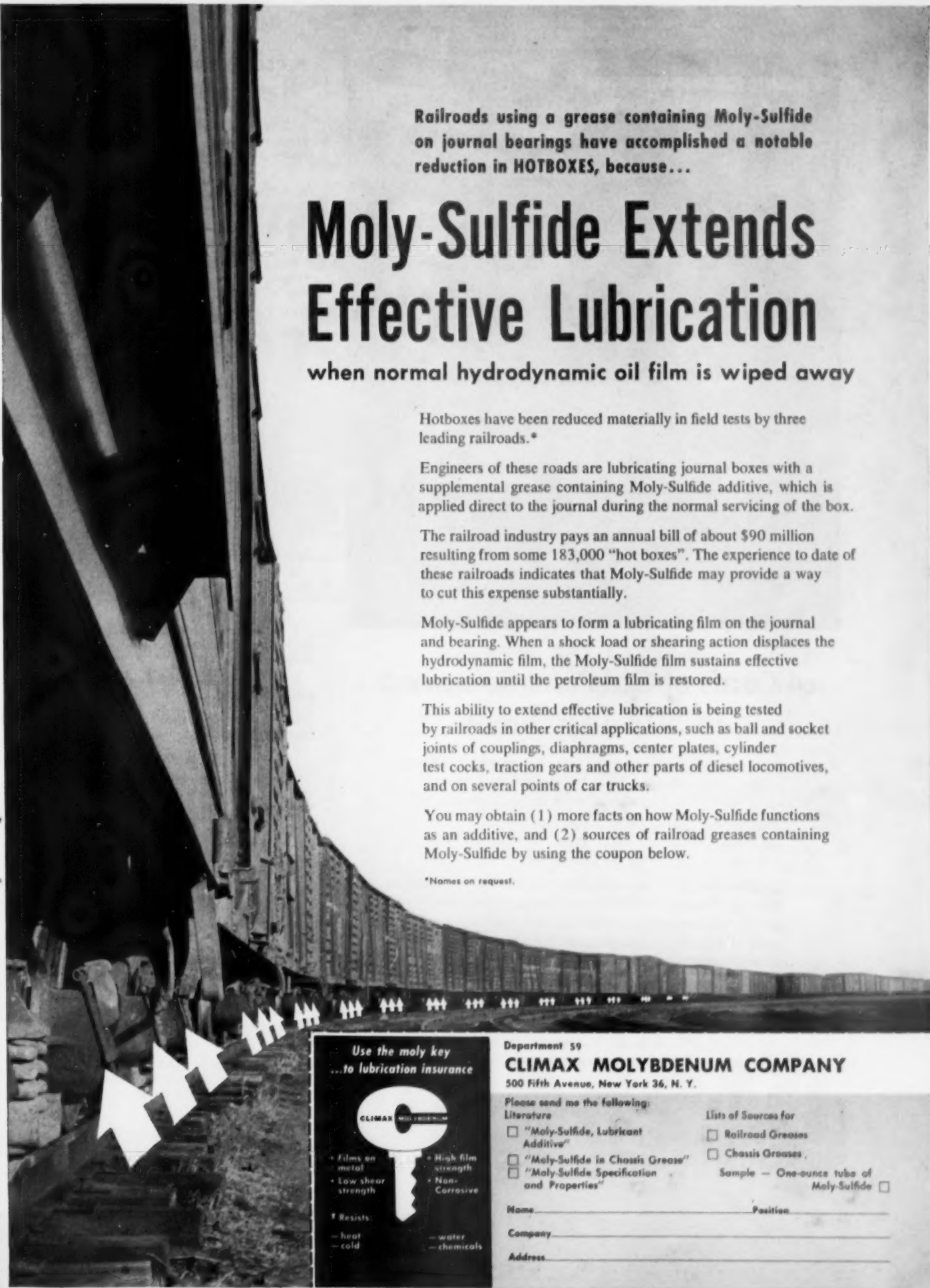
A—The use of running position has the advantage of avoiding stuck brakes, due to overcharging on locomotive and cars near it.

W132-Q—When using release position, what precaution must be taken?

A—The length of time that the automatic brake valve is in Release position must be carefully determined.

W133-Q—Why is this necessary?

A—The brakes may reapply on light overcharge when the brake valve handle is returned to running position.



Railroads using a grease containing Moly-Sulfide on journal bearings have accomplished a notable reduction in HOTBOXES, because...

Moly-Sulfide Extends Effective Lubrication

when normal hydrodynamic oil film is wiped away

Hotboxes have been reduced materially in field tests by three leading railroads.*

Engineers of these roads are lubricating journal boxes with a supplemental grease containing Moly-Sulfide additive, which is applied direct to the journal during the normal servicing of the box.

The railroad industry pays an annual bill of about \$90 million resulting from some 183,000 "hot boxes". The experience to date of these railroads indicates that Moly-Sulfide may provide a way to cut this expense substantially.

Moly-Sulfide appears to form a lubricating film on the journal and bearing. When a shock load or shearing action displaces the hydrodynamic film, the Moly-Sulfide film sustains effective lubrication until the petroleum film is restored.

This ability to extend effective lubrication is being tested by railroads in other critical applications, such as ball and socket joints of couplings, diaphragms, center plates, cylinder test cocks, traction gears and other parts of diesel locomotives, and on several points of car trucks.

You may obtain (1) more facts on how Moly-Sulfide functions as an additive, and (2) sources of railroad greases containing Moly-Sulfide by using the coupon below.

*Names on request.

Use the moly key
...to lubrication insurance



- Films on metal
- High film strength
- Low shear strength
- Non-Corrosive
- Resists:
 - heat
 - water
 - cold
 - chemicals

Department 59

CLIMAX MOLYBDENUM COMPANY

500 Fifth Avenue, New York 36, N. Y.

Please send me the following:
Literature

- ☐ "Moly-Sulfide, Lubricant Additive"
- ☐ "Moly-Sulfide in Chassis Grease"
- ☐ "Moly-Sulfide Specification and Properties"

Lists of Sources for

- ☐ Railroad Greases
- ☐ Chassis Greases

Sample — One-ounce tube of Moly-Sulfide ☐

Name _____ Position _____

Company _____

Address _____



4 Coats of Old Paint Removed in 50% Less Time!

The problem facing a large western railroad maintenance department — how to rapidly and effectively strip several railroad cars. With Magnus Stripit, they were able to strip each car in far less than half the previous time. The cars were bare-metal clean, in less man hours, with less material.

Magnus Stripit is especially practical because it successfully removes all coatings such as primers, lacquers, and enamels . . . quickly, and does not require neutralizing rinse. Stripit is safe to use on *all* metals or wood.

Write to Magnus Chemical Company, Inc., 77 South Avenue, Garwood, N. J. with full particulars of your stripping operations. We'll have a representative call with the answer to your problem!



**RAILROAD DIVISION
MAGNUS CHEMICAL CO., INC.**

—a world-wide organization specializing in cleaning and protection of all surfaces.

PERSONAL MENTION

(Continued from page 14)

Northern Pacific

C. H. MOREAU, master mechanic at Jamestown, N. D., appointed master mechanic at St. Paul.

C. J. WIRTH, assistant master mechanic at Seattle, appointed master mechanic at Jamestown, N. D.

Pennsylvania

Buckeye Region

VANCE J. HOOVER, foreman at Northumberland, Pa., car shops, appointed supervisor of car equipment at Cincinnati.

St. Louis-San Francisco

INDUSTRIAL ENGINEERING DEPARTMENT Springfield, Mo.

(A newly created department, under the jurisdiction of the vice-president-operations. Objective: the analysis of problems relating to practices, organization, procedures, facilities, equipment and service. The department will devise ways and means of improving services and coordinating the efforts of all departments; plan routine and scheduled maintenance for improved utilization of existing equipment, and study new equipment to see if its purchase will be advantageous.)

H. L. GASTLER appointed director of industrial engineering.

H. M. WARD appointed supervisor of office procedures.

Seaboard Air Line

E. P. BLEDSOE, assistant shop superintendent, appointed shop superintendent at Jacksonville, Fla.

S. D. DEKLE, master mechanic at Jacksonville, Fla., retired.

C. H. CAMPBELL, system diesel supervisor at Hamlet, N. C., retired.

Southern

CECIL D. SCHWINE, JR., manager Coster shop at Knoxville, Tenn., appointed manager, Spencer Shop, at Spencer, N. C.

WALTER W. SIMPSON, JR., general foreman car department at Hayne car shop, Spartanburg, S. C., appointed manager Coster Shop at Knoxville, Tenn.

JOSEPH F. CLEMO, general foreman car repairs at Birmingham, Ala., appointed general foreman car repairs at Spencer, N. C.

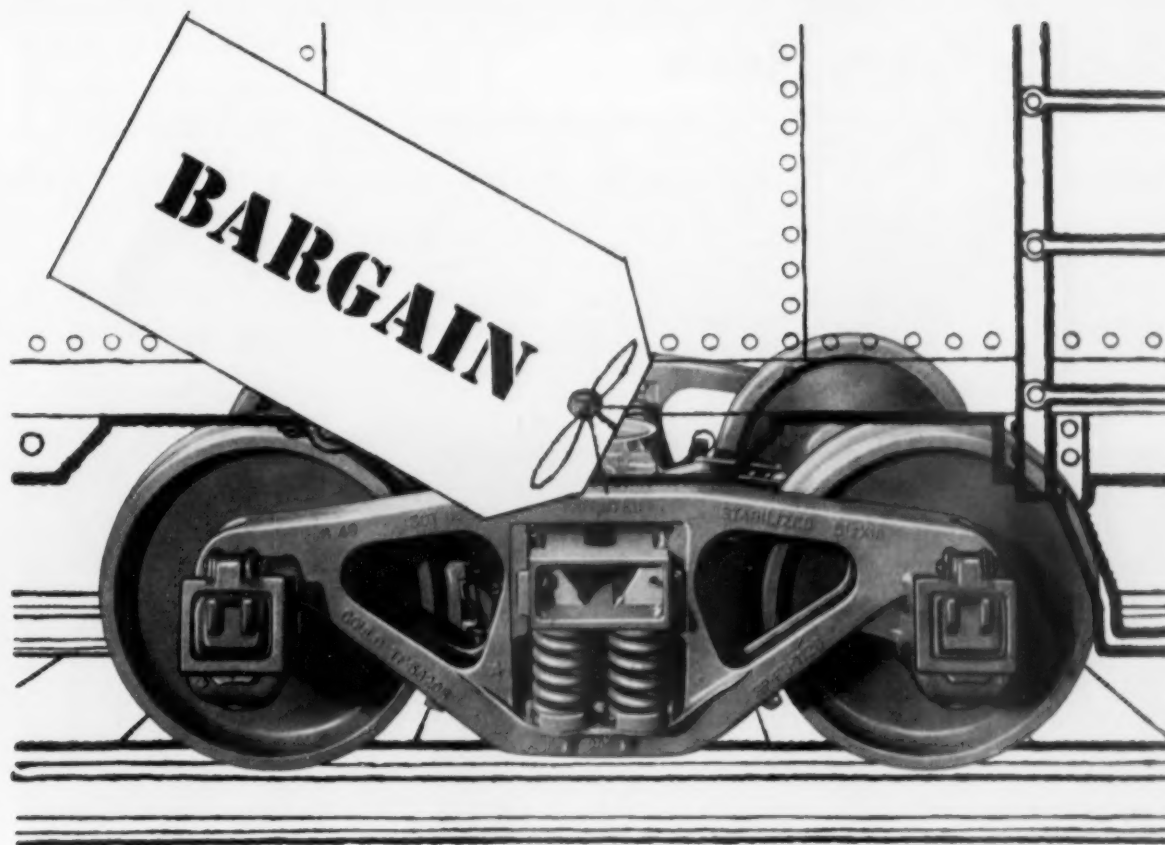
LAWRENCE S. PRESSON, JR., appointed general foreman car department-passenger at Hayne Shop, Spartanburg, S. C.

OLIVER H. DUNCAN appointed general foreman diesels at Sevier Shop, Knoxville, Tenn.

L. STANLEY CRANE, engineer of tests at Alexandria, Va., appointed mechanical research engineer at Washington, D. C.

Obituary

CHARLES A. SHAFFER, retired general machinery superintendent of the Illinois Central, died April 26 at Little Rock, Ark.



COSTS SO LITTLE . . .
GIVES SO MUCH PROTECTION



Today Barber Stabilized Trucks are a greater bargain than ever because their savings are greater! Higher speeds mean more chances for costly damage to loadings and equipment.

Barber Stabilized Trucks provide a safe, dependable system of suspension and protection. Actuating springs, friction shoes and wear plates work together as vertical dampers and truck resquaring devices. Bumps and bounces are cushioned and compensated, nosing and violent swivelling prevented. Thousands of damage claims are *completely eliminated*; your equipment is protected; rail pounding and track maintenance are reduced.

We firmly believe that *nothing* you specify does so *much* for your railroad yet costs so *little* as Barber Stabilized Trucks! Standard Car Truck Co., 332 S. Michigan Avenue, Chicago 4, Ill. In Canada: Consolidated Equipment Company, Ltd., Dominion Square Building, Montreal 2.

Specify Smoother-Riding

BARBER
STABILIZED TRUCKS

Supply Trade Notes

NATIONAL ELECTRIC PRODUCTS CORPORATION.—D. W. Rice has been appointed product sales manager of the conduit division.

AMERICAN STEEL FOUNDRIES.—John C. Day, sales agent at Chicago, has been transferred to New York, and E. E. Kraegel has been transferred from New York to Chicago as a sales agent.

RIDGE TOOL COMPANY.—William L. Parcell, sales manager, has been named

vice-president, continuing also as director of sales.

C & D BATTERIES, INC.—George E. Stephenson has been appointed a representative in the Phoenix-El Paso, Tex., areas. Mr. Stephenson will headquarter at the Toncray Equipment Company, Denver agent for C & D.

DRESSER INDUSTRIES, Dresser Manufacturing Division.—Matthew W. McMahon has been appointed eastern district man-

ager, railroad sales, and J. Alex Bader, western district manager, railroad sales. S. M. Houston, Modern Transportation Supplies, San Francisco, has been appointed Dresser's manufacturer's representative in California.



JBS CHENILLE ROLL PACKING

A.A.R. approved for
use in interchange

- Improves lubrication
- Reduces hot box causes
- Boxes quickly and easily repacked
- The most economical lubricator

Available in cotton or wool-cotton yarns.
Withstands hard service and is RECLAIMABLE.

*Serving the railroads for more than 25 years
and ready for continued service in 1956*

JOURNAL BOX SERVICING CORPORATION
332 South Michigan Avenue, Chicago 4, Illinois

**This famous
BRASS TRIMMER**

saves thousands of dollars a year! Used at periodical re-packing time, the trimmer perfectly restores the oil grooves of journal bearings. **EASY TO USE.** The most inexperienced man may perform the job at carside within three minutes.

BEARINGS BETTER THAN NEW! Trimming and reapplication to the journals from which removed result in **PERFECTLY FITTED BEARINGS** and eliminate the hazard of failure during the otherwise crucial break-in period of a new bearing. Many years of service verify savings of \$5.00 and more per car.



**Rent
or
buy**

**The A.A.R. has approved trimming of bearings
as a chargeable item on cars in interchange.**



R. M. Vollan



J. W. Bonnin

FAIRBANKS, MORSE & CO.—Robert M. Vollan, sales engineer, has been transferred from Cleveland to the Railway Products Department at Chicago. Joseph W. Bonnin, formerly located at Fair Lawn, N. J., succeeds Mr. Vollan at Cleveland. Dennis C. Kennedy has been appointed sales representative at Chicago.

JOSEPH T. RYERSON & SON.—Howard A. Stai has been appointed manager of tubular steel products and cold finished steel bar sales at Seattle, Wash., succeeding Loren B. Clay who has been transferred in a similar capacity to Los Angeles.

GRIP NUT COMPANY.—The Chicago sales offices have been moved to new and larger quarters at South Whitley, Ind.

AMERICAN BRAKE SHOE COMPANY, NATIONAL BEARING DIVISION.—Bart A. Rossfeld, assistant vice-president, has been appointed vice-president at St. Louis. Albert L. Hunt has been appointed general manager of the division's St. Louis plant.

SAFETY INDUSTRIES, INC.—The name of the Safety Car Heating & Lighting Co. has been changed to Safety Industries, Inc. (turn to page 94)

**LATEST TYPE BROWNHOIST
DIESEL ELECTRIC PILE DRIVER
AT WORK FOR
AMERICA'S RAILROADS**



BROWNHOIST DIESEL ELECTRIC PILE DRIVERS HAVE THE SPEED TO GET OFF MAIN LINES QUICKLY, AND THE LONG LEADERS AND FULL CIRCLE ROTATION TO WORK IN ANY POSITION

Propelled by electric travel motors, these Industrial Brownhoist machines are capable of road speeds up to 18 miles per hour . . . they get on and off main lines in a hurry. Strut and leaders fold away for travel, allowing full railroad clearance, and they're quickly and easily fastened in upright position for battering. The Brownhoist rotates in a full circle, and its leader reach of 28'6" from center of rotation gives it a wide working range. A large Diesel engine supplies the power for the heavy-duty Brownhoist machine. It has a maximum leader load of 26,000 pounds, and is equipped with power battering to sink piles as large or larger than that shown in the upper photograph. For further information about Diesel Electric Pile Drivers or other heavy-duty materials handling equipment, write today for your copy of the new Industrial Brownhoist catalog.



189

BROWNHOIST

BROWNHOIST MATERIALS
HANDLING EQUIPMENT
GIVES A LIFT TO
AMERICAN INDUSTRY



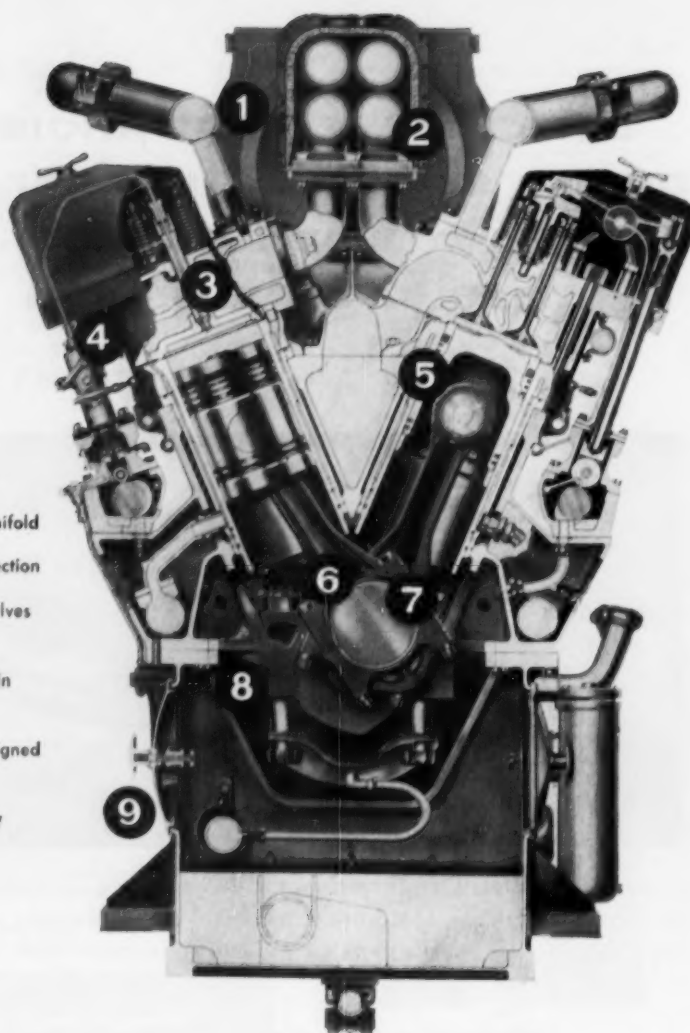
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INDUSTRIAL BROWNHOIST CORPORATION
BAY CITY, MICHIGAN • DISTRICT OFFICES: New York,
Philadelphia, Cleveland, Chicago, San Francisco, Montreal
AGENCIES: Detroit, Birmingham, Houston

ALCO's Factory Rebuild Service
remanufactures your 244
diesel engines completely
— including these important items:

- ① ALCO 510 turbosupercharger installed
- ② Ni-Resist castings in rebuilt exhaust manifold
- ③ 10-hole fuel nozzles for better fuel injection
- ④ High-pressure fuel lines and snubber valves for better combustion, reduced erosion
- ⑤ Pistons rebanded with Ni-Resist inserts in top ring groove
- ⑥ New main and conn-rod bearings, designed for hardened crankshaft
- ⑦ Crankshaft hardened and resurfaced by chrome-plating
- ⑧ Serrated fit between cap and block
- ⑨ Two-piece idler gear with inboard and outboard bearings



DO YOUR ALCO 244 REBUILD SPECIFICATIONS INCLUDE THESE ITEMS?

Complete engine remanufacturing by ALCO is made possible by extensive investments in facilities and machinery. ALCO's Factory Rebuild Service has also developed repair techniques to a high level of proficiency. The result is an engine remanufacturing service that is complete and thorough, returning to you a 244 engine that will provide superior service.

Investigate ALCO's Factory Rebuild Service when you have modernization plans for 244 engines. A complete remanufactured engine costs less than you may think. For information contact your nearest ALCO sales office or write P. O. Box 1065, Schenectady 1, New York.

ALCO

ALCO PRODUCTS, INC.

NEW YORK

Sales Offices in Principal Cities

Standard Engineer's Field Report

CASE HISTORY
Calol Filter Coat
PRODUCT

Milwaukee R.R.
FIRM *Tacoma, Washington*

Special adhesive coating increases efficiency of filters up to 50%



THE MILWAUKEE ROAD has used Calol Filter Coat on impingement-type car body and engine air intake filters since 1953, when it was first available to railroads. It proved completely superior to previous oils on these filters, increasing efficiency up to 50%—according to the District Diesel Supervisor. To service the great number of filters in use, the company installed a special production line. Coating process starts with steam and chemical cleaning of filters, then dipping in heated Calol Filter Coat (above). After draining 15 min-

utes, filters are placed in drying ovens. Calol Filter Coat gives complete protection not only against heavy dirt and dust, but grit from sanding. Even under these adverse operating conditions, Calol Filter Coat did not drip off screens, but maintained its high wicking ability, and kept dust and grit out of engines.

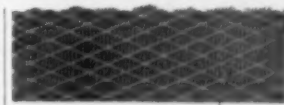


TRADEMARK "CALOL" REG. U. S. PAT. OFF.

FREE CATALOG: "How to Save Money on Equipment Operation", will be sent on request to Standard Oil Company of California, 225 Bush St., San Francisco.

FOR MORE INFORMATION about this or other petroleum products, or the name of your nearest distributor, write or call Standard Oil Company of California.

Why Calol Filter Coat ups efficiency of air filters



Will not drip off screens—
gives full filtering efficiency
through entire service period.

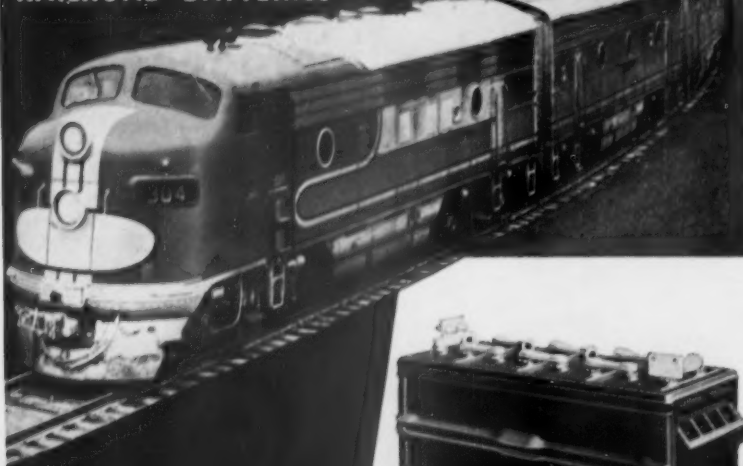
Easily applied and cleaned.

High wicking ability—quickly
soaks dust particles.

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20 • STANDARD OIL COMPANY OF TEXAS, El Paso
THE CALIFORNIA OIL COMPANY, Perth Amboy, New Jersey • THE CALIFORNIA COMPANY, Denver 1, Colorado

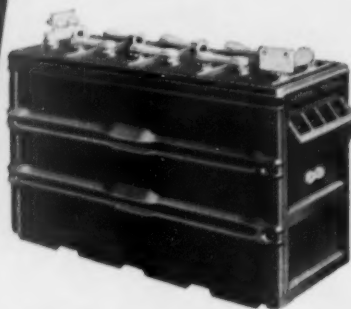
START FAST! COOL QUICK!

with **C&D**
RAILROAD BATTERIES



Use C & D Silver-Clad* batteries in your equipment. Why? Because C & D batteries meet all the requirements for rugged railroad service. Each powerful, heavy-duty positive plate has five separate layers of insulation. Because of this famous method of insulation and retention "shedding" is no longer a determining factor in battery life. Thus with C & D batteries you get longer life, higher capacity!

*T.M. Reg.



C & D Diesel starting batteries give:

1. High sustained voltage
2. Reduced maintenance requirements
3. Reduced connection loss

For complete details, write for Bulletin DL-576



C & D Carlighting and Air Conditioning batteries give:

1. Lowest annual cost
2. Steady uniform voltage
3. Reduced maintenance requirements

For complete details, write for Bulletin AC-546

C&D

BATTERIES, INC.
of Conshohocken, Pa.

Industrial Batteries Since 1906

Sales and Service Offices in Principal Cities from Coast to Coast

SUPPLY TRADE NOTES

(Continued from page 90)



J. A. Campbell



E. A. Hall

WESTINGHOUSE AIR BRAKE COMPANY, Air Brake Division.—*J. Allan Campbell* has been appointed district manager, Pacific District at San Francisco succeeding *J. B. Hull*, retired. *E. A. Hall* succeeds Mr. Campbell as representative at San Francisco. *J. G. Rees* has been appointed manager, Order Service Section, sales department, at Wilmerding, Pa.



J. J. Hennessy

HENNESSY LUBRICATOR COMPANY.—*J. J. Hennessy, Jr.*, whose recent election as president of Hennessy Lubricator Company was announced in the May issue, was graduated from George Washington Univer-



While your Diesel engines are "grinding out the miles"; let's be sure that dirt in lubricating oil isn't doing a grinding job on your dollars!

Grit, you can't even see, can develop enough abrasive wear to cripple a locomotive engine. And, it doesn't take long! Constant, unfailing oil filtration . . .

WIX ENGINEERED FILTRATION . . . is the practical, dollar-saving answer to the problem of removing contaminants from fuel and lube oil.

Keep abrasive foreign matter and tarry sludge out of *your* Diesel engines with **WIX OIL FILTER CARTRIDGES**. They are *Engineered* to give greater protection and longer service at a price ridiculously low compared to the money they save!

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ENGINEERED FILTRATION
WIX CORPORATION • GASTONIA, N. C.
 Warehouses
 GASTONIA • NEW YORK • DES MOINES • SACRAMENTO • ST. LOUIS

Oil Filter Cartridges for Diesel Fuel and Lubrication

 Write for the WIX Railroad Oil Filter Catalog today.

FRAHM® and JAGABI®

Speed Measuring Instruments

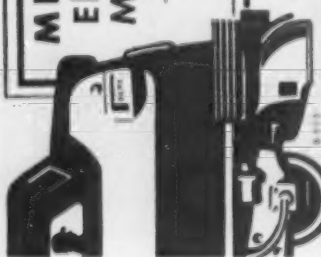
... to meet every requirement
Write for Bulletin 35-X



MEGGER®
Electrical Resistance Measuring Instruments

... for all electric, Diesel-electric locomotives and other electrical equipment testing requirements.

Write for File RR #1



JAMES G. BIDDLE CO.

Electrical & Scientific Instruments

1316 ARCH STREET, PHILADELPHIA 7, PA.

BE SURE YOU'RE ON THE RIGHT TRACK

ALWAYS SPECIFY

sity in 1949, after which he joined Hennessey Lubricator as service engineer, becoming vice-president in 1953.

TRANE COMPANY.—*Randall W. Johnson* has been appointed assistant manager, Transportation Department, eastern sales offices.

NATIONAL MALLEABLE & STEEL CASTINGS CO.—*Jack E. Fathauer* has been appointed sales manager, railway division, Cleveland district.

A. M. BYERS COMPANY.—*Robert J. Bricmont*, of the engineering service department, has been named manager of that department.

CRUCIBLE STEEL COMPANY.—A new Spring Division, established as a separate

unit within the company, combines all previously existing spring fabrication and sales activities. *Thomas T. Crowley* has been appointed general manager. *William Krepps* continues as manager of sales of the railway spring department.

ALCO PRODUCTS, INC.—A warehouse for the handling of replacement and renewal locomotive and engine parts has been opened at 6363 Corsair avenue, Los Angeles. The building is 100 ft wide and 250 ft long, with a floor space of 21,000 sq ft.

WHITING CORPORATION.—*H. B. Caldwell* has been appointed manager of the New York district office, in charge of sales in eastern New York state, northern New Jersey and all New England.

EQUIPMENT (Continued from page 6)



available to fill in where necessary. The lamp is 2 1/4 in. in diameter and is rated at 200 watts. *General Electric Company, Nela Park, Dept. RLC, Cleveland 12, Ohio.*

Metal Cleaner

Lix Solvener No. 512 is an all-purpose cleaner for removing petroleum residue, asphalt, etc., from ferrous and nonferrous metals. It is non-corrosive, non-toxic and non-inflammable and will not attack painted surfaces. No caustic compounds of any sort are present and the pH is less than 9.

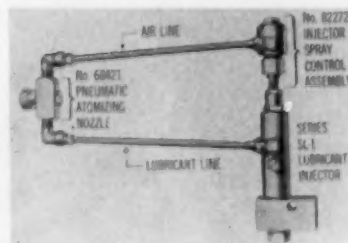
The product is diluted with water to form an emulsion, or it may be diluted with mineral spirits. Best results are attained at room temperature. *Lix Corporation, Dept. RLC, 716 East 85th street, Kansas City, Mo.*

Power-Groove Fluorescent Lamps

These fluorescent lamps are said to have double the light output of present tubes of equal length. Increased light is made possible by a change in tube design. It features a series of lengthwise dents or grooves along one side of the 8-ft long fluorescent tube. At the grooves, the tube is nearly U-shaped in cross-section to permit a maximum circumference while constricting its inside area.

Greater light output results from an increased area of the lighted surface, the higher wattage at which it can be operated and more efficient use of energy within the tube. New ballasts have been designed and new fixtures will have to be designed to accommodate the lamp. It will be used in new installations, and not for replacements in existing fixtures.

The lamps are expected to extend the use of fluorescent lighting into areas which heretofore have used incandescent and mercury sources. Basic lengths of the lamps will be 8 ft, but 4 ft lamps will be



Lubrication Sprayer

Controlled, pre-measured quantities of mist lubrication for open gears, chains, rollers, eccentrics, slides and ways, circular saws and similar surfaces can be applied by the *MistOmatic Spray Control*, according to the manufacturer.

The unit was designed for use in conjunction with the maker's power-operated, time-controlled centralized lubrication sys-



TRAIN "X"

Back of this dramatic advance in railway passenger equipment built by Pullman-Standard is the creative engineering that makes a revolutionary concept a reality. The New York Air Brake Company is proud to have designed and built the "LWE" Brake System specifically selected for these famous trains.

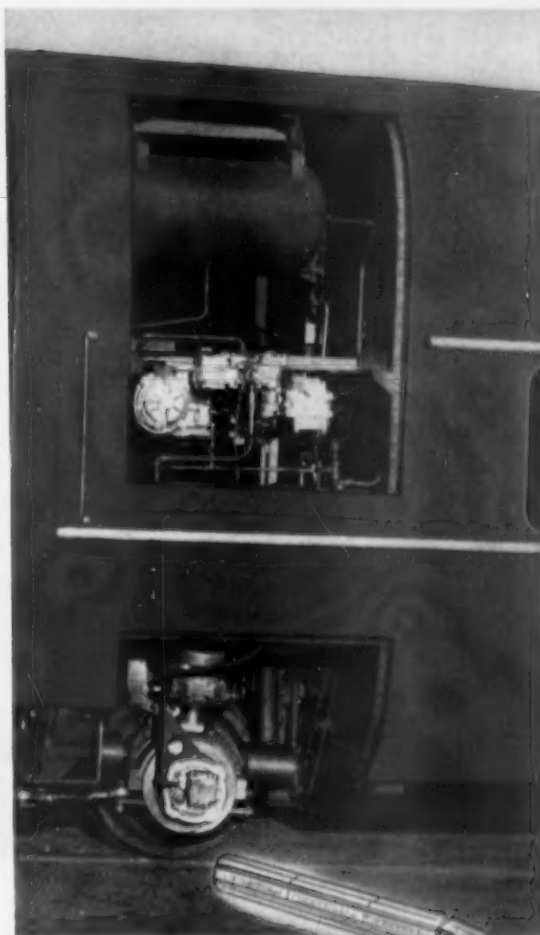
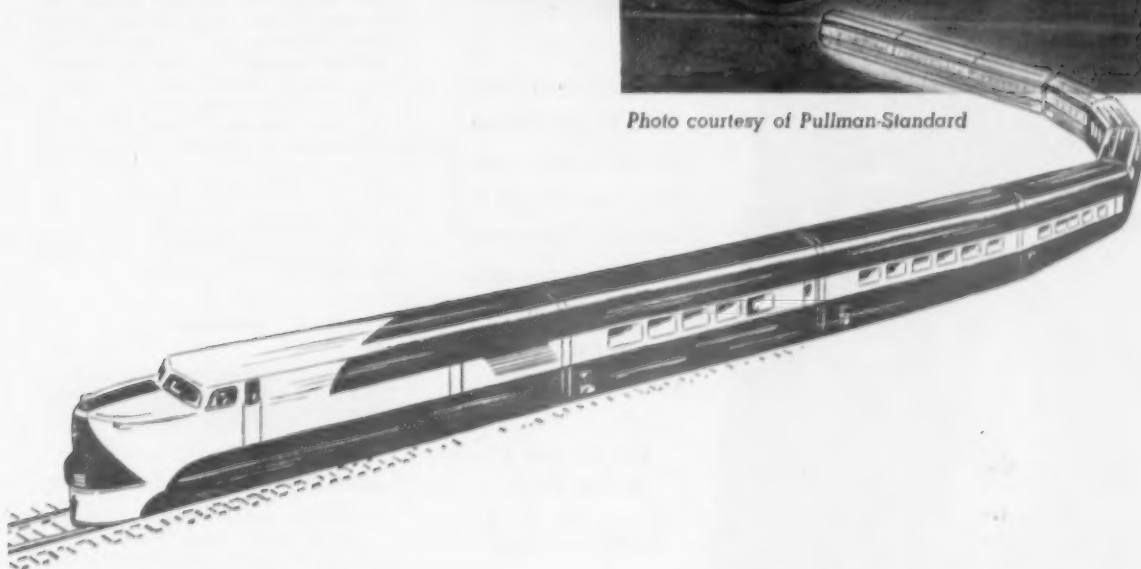


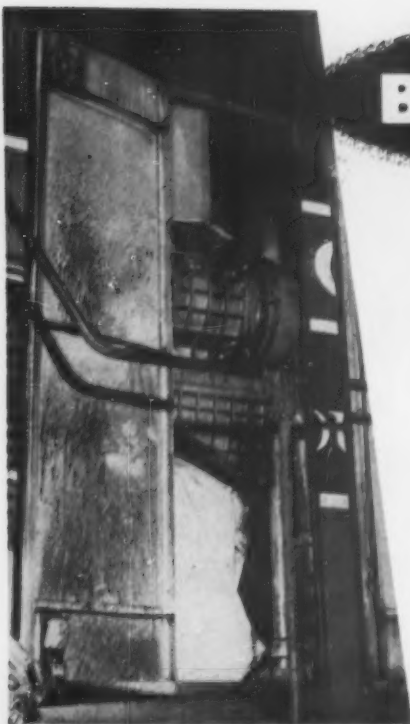
Photo courtesy of Pullman-Standard



THE NEW YORK AIR BRAKE COMPANY

230 PARK AVENUE • NEW YORK 17, N. Y.





BEFORE:

If your problem is cleaning Diesel Engine surfaces that look like this inspection door, then we can help you. With "Lix Engine Room Wash" you can literally rinse away, grease, soil, even the toughest Crater Compound without brushing or rubbing. Just spray the surface with "Lix Engine Room Wash", then rinse with water or solvent.



AFTER:

Many railroads using "Lix Engine Room Wash" report complete units cleaned in less than three man hours. Lix is safe, too. It is non-toxic and free from fumes . . . will not harm the skin.

*Why not test it
in your shop?*

Write Today!

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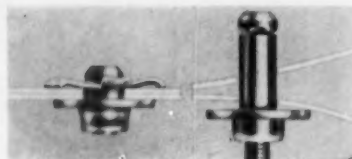
The LIX CORPORATION
OF MISSOURI

716 EAST 85th ST. — DEPT. RL-6
KANSAS CITY, MISSOURI

EXPORT DIVISION — BOX 301 — KANSAS CITY, MO.



tems. The device gives positive lubrication without waste; eliminates spoilage from drippage of excessive lubricant; conserves man-hours; and reduces fire and accident hazards. *Lincoln Engineering Company, Industrial Division, Dept. RLC, 5702-14 Natural Bridge avenue, St. Louis 20.*



Blind Rivet

A blind rivet, called the Daisy because its "driven" appearance, is comprised of a hard aluminum pin with five cutting edges and a hard aluminum sleeve with large or small washer flange, as desired. The assembled rivet is inserted into a blind hole from the driving side and a tool pulls the pin head through the sleeve, splitting the sleeve into five powerful levers. These spread and curl back against the blind side, pulling the work tightly together and holding it braced in a permanent grip over a large bearing area. In the same operation a swaging anvil flows the outer collar material into the locking grooves on the pin and breaks off the excess rivet pin leaving a neat, sturdy stub. Because of the wide bearing surfaces of this rivet, it can be used without careful attention to hole size and will withstand substantial loads in shear or stress without pull-through or tear-out.

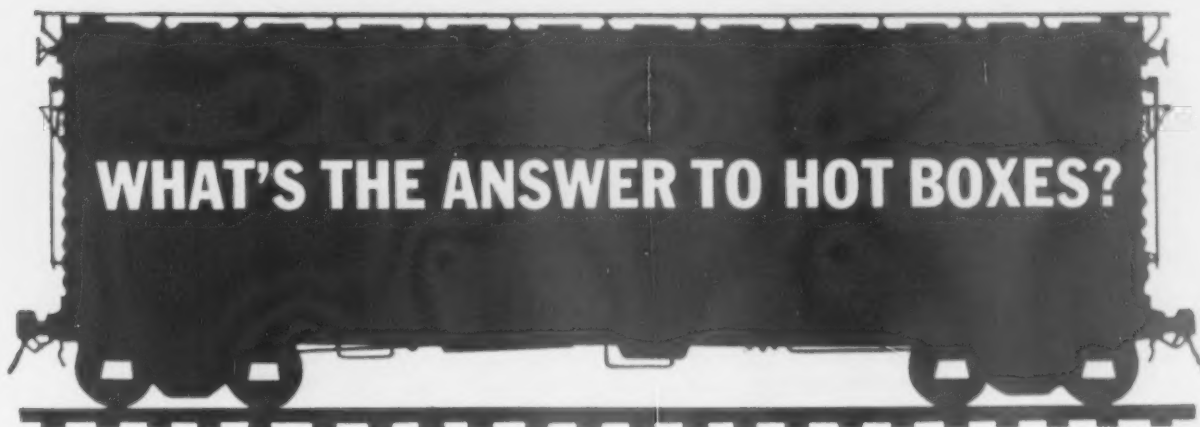
The rivet has a wide grip range in any of its sizes, making it possible to pull together sheets of widely varying thicknesses without changing rivet sizes. These rivets are easily and quickly installed by one unskilled operator with either a mechanical hand tool or pneumatic driving tool. *Huck Manufacturing Company, Dept. RLC, 2480 Bellevue avenue, Detroit.*



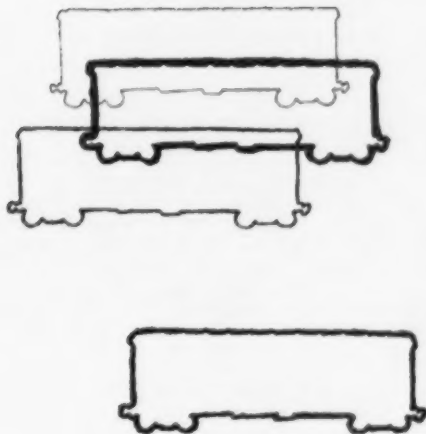
Catenary Section Insulator

A catenary section insulator employing a melamine plastic beam is available for use on electrified railroads and rapid transit lines. According to the manufacturer the glass-fabric base melamine plastic beam gives the insulator an ultimate strength of approximately 22,000 lb, a high resistance to arc and fire, and excellent weathering properties.

It is available in two standard lengths with either 48-in. or 24-in. of clear insulation between end castings. The 48-in. size is designed for currents up to 11,000 v a-c while the 24-in. model is for voltages ranging between 600 and 3,000 d-c or for 3,300 v a-c. Other lengths can be furnished



Wise maintenance, not gimmicks!



"Stop hot boxes" ... "No more hot box troubles" ... so it goes, all the headlines promising the magic cure. But is it really that simple? Are lubricating "gadgets" the real answer to the hot box problem?

First, and perhaps most important of all, these devices still have to be proved in service, since most of them have been approved on the basis of short-time tests. Only time will tell if they can withstand the severe shocks of actual operation. Secondly, these mechanical or other contrivances are expensive. Finally, they present problems for maintenance men because they all have a little bit different construction and handling procedures.

A study of the maintenance records for a group of typical railroads using thread packing shows an average of nearly 900,000 miles per hot-box car. However, some lines roll up almost four times the mileage of others ... without higher maintenance expenditures. The answer seems to lie in the "good housekeeping" of these roads ... spending the same number of maintenance dollars, but more wisely.

We can help you with this problem. Our members specialize in the production of thread packing ... the best available. We've worked hand-in-hand with the AAR to develop top-quality packing. Our Seal on bales of new packing guarantees quality which meets or exceeds AAR requirements. It has been proved that the economies and service life of thread packing, used in 90% of the nation's rolling stock, are still tops.

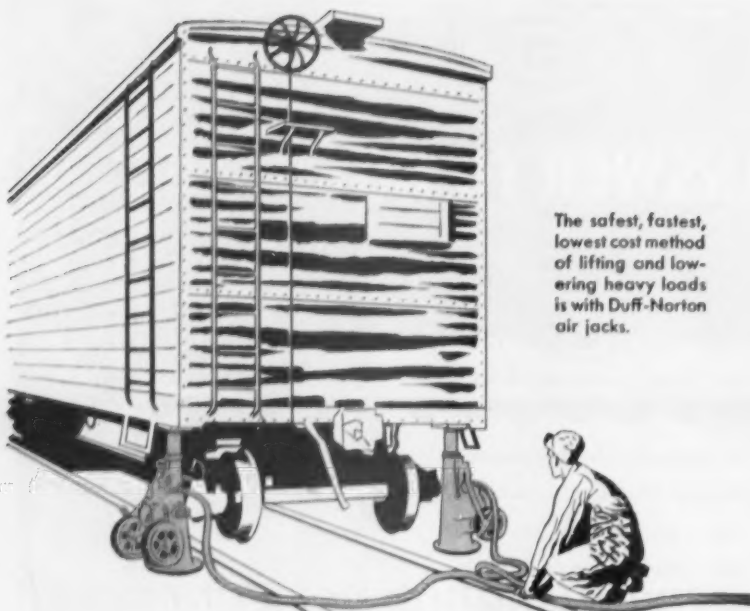


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National Waste Company, New York, N. Y.
O'Neill Brothers, Inc., Philadelphia, Pa.
The Pittsburgh Waste Co., Inc., Swissvale, Pa.
Riverside Mills, Augusta, Ga.
Royal Manufacturing Company, Perth Amboy, N. J.
Southland Manufacturing Co., Inc., Norfolk, Va.
Twiss City Textile Mills Waste Co., St. Paul, Minn.



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One man wheels a pair of precision built, 20-ton capacity, 28-in. high Duff-Norton air motor powered screw jacks (Model 228-R) into position one at a time, connects them to the "Y" valve, then turns the dual controls and up goes the car 18 inches (the maximum height) in less than 2 minutes. Ordinary shop pressure of 80-100 lbs is all you need to operate these time and money saving jacks.

Other models available in 35, 50, 75, 100-ton capacities capable of lifting and holding the heaviest diesels or cars without danger of creeping, over-running, or dropping the load because these are safe, dependable, time-tested screw jacks with air power used only to turn the screw. Even if the air failed or line were severed, load couldn't drop. Air motor must be used also to lower load.

Thousands of these jacks are in use by leading roads throughout the world and have been for 20 years.

If you use air now for other tools, why not use it to raise and lower locomotives, cars (empty or loaded), handle heavy machinery, repair bridges, push large diameter culvert pipe through solid earth or fill?

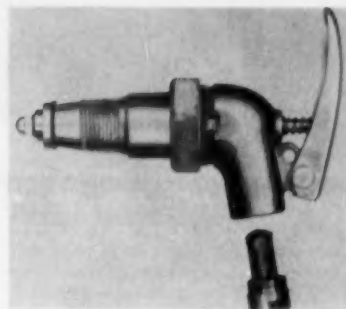
Write for 8-page illustrated brochure giving complete specifications on the 6 models available and how they pay for themselves in a short time. Ask the world's oldest and largest manufacturer of lifting jacks for brochure AD-11-G, Duff-Norton Company, Pittsburgh 30, Pa. There's no charge or obligation whatsoever.

DUFF-NORTON

"Giving The Railroads
A Lift Since 1883"

Jacks

on special order. The insulator may be used with or without gliders. Provision is made for attaching gliders by means of a 3-bolt clamp at each end and on opposite sides of the beam. *Ohio Brass Company, Dept. RLC, Mansfield, Ohio.*



Drum Faucet

This device, designed for the safe control of flammable liquids, can be used with any container that has a $\frac{3}{4}$ in. bung opening. A swivel head permits the faucet to be screwed into the bung opening. When a firm, tight threaded connection is secured, the pouring spout is swivelled to the correct position for use and tightened with a knurled locking nut.

A spring-mounted handle permits dispensing only when attendant is present. Flow of liquid stops completely when handle pressure is removed. A cylindrical perforated brass flame arrester, which also serves as a strainer, is located within the faucet at the dispensing opening. The body of the device is nonsparking brass and the handle is cadmium plated. Neoprene or Thokal gaskets are normally supplied, but other gasket materials are available. *Protectoseal Company, Dept. RLC, 1920 South Western Avenue, Chicago 8.*

Electric Toilet

Several test installations of electric incinerating toilets are expected to be made shortly in diesel locomotives. These units were originally designed for use in military aircraft and are reported to have operated satisfactorily. In locomotive service the problem of freezing and the necessity of filling a toilet water tank while the locomotive is being serviced are eliminated.

This industrial toilet, weighing less than 40 lb, only requires bolting to the floor, an electrical connection to supply the heaters, and a vent to the outside. The unit requires approximately 1,250 watts. Waste to be disposed of is reduced to ash or is evaporated and is emptied from the unit automatically. Already available are similar units operating on natural, propane, or butane gas. Gasoline and diesel fuel fired units are being designed. *National Research Products Company, Dept. RLC, P.O. Box 7171, Fort Worth, Texas.*



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FREIGHT CARS!**




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Helps from Manufacturers

The following compilation of literature—including pamphlets and data sheets—is offered free to railroad men by manufacturers to the railroad industry. To receive the desired information, please write direct to the manufacturer.

1. V BELT DRIVES. 44-page booklet (20P50) contains multi-color tables for quick and easy selection of variable speed "Texrope" drives. Includes information on design features, drive principles, hp rating tables, speed range table and accessory equipment. (Write: *Allis-Chalmers Manufacturing Company*, Dept. RLC, 1253 S. 70th Street, Milwaukee, Wis.)

2. WIRE ROPE. 24-page data booklet (DH129D) gives recommended uses covering more than 120 different types of wire rope. Rope diameters, construction, preforming, lay, grade and core are given. Charts cover weights and breaking strength. (Write: *Hasard Wire Rope Division, American Chain & Cable Co., Inc.*, Dept. RLC, Wilkes-Barre, Pa.)

3. CUTTING MACHINES. 4-page bulletin features eight Beaver "Speed-Cut" abrasive cutting machines including trailer mounted unit. Gives specifications, descriptions, cutting times. (Write: *Beaver Pipe Tools*, Dept. RLC, Warren, O.)

4. SPRAY PAINTING. Maintenance painting catalog describes new DeVilbiss PCGA spray gun for 1/2 or 3/4 hp, air compressor. Also describes PQBF paint pump and portable paint heater. Contains easy-to-read chart for selecting correct spray gun for various classes of materials, and gives descriptive information. (Write: *The DeVilbiss Company*, Dept. RLC, 300 Phillips Avenue, Toledo 1, Ohio.)

5. FORCE GAUGE. 6-page bulletin (11E) describes the Dillon Mechanical Force Gauge—Model X for precision measurement of pressure, tensile or torque. Describes uses and gives tables of dimensions. (Write: *W. C. Dillon & Co., Inc.*, 14620 Keswick Street, Dept. RLC, Van Nuys, California.)

6. GRINDING WHEELS. 4-page, 3-hole punched catalog supplement describes the DoALL line of surface grinding and bench grinder wheels. Composition and applications of fundamental types of wheels are featured. (Write: *DoALL Company*, Dept. RLC, Des Plaines, Ill.)

7. BATTERIES. Illustrated catalog describes line of Exide-Manchex batteries for stationary power applications. Includes cutaway drawing showing details of construction. (Write: *Exide Industrial Division, The Electric Storage Battery Company*, Dept. MC RLC, Box 8109, Philadelphia 1, Pa.)

8. FORK TRUCK. 4-page folder illustrates and describes 3,000 lb. capacity Cargo Scout fork truck, second in series. Contains installation and product photos, engineering drawings, detailed specifications, design features. (Write: *Elwell-Parker Electric Company*, Dept. RLC, 4205 St. Clair Avenue, Cleveland 3, Ohio.)

9. WELDING. 140-page Pocket Data Book (TIS 2575) features simplified welding procedures for every base metal. Covers 120 welding rods, electrodes and welding compounds. Gives useful "how-to-weld" information and describes special

welding operations. (Write: *Technical Information Service, Eutectic Welding Alloys Corporation*, Dept. RLC, 40-40 172nd Street, Flushing 58, New York.)

10. AIR-POWERED EQUIPMENT. "Production and Plant Ideas," a new bi-monthly publication, contains illustrated "idea" articles on the use of air-powered equipment in production and maintenance work. (Write: *Keller Tool Division, Gardner-Denver Company*, Dept. RLC, Grand Haven, Michigan.)

11. TURBINES. 28-page, hole-punched, bulletin (GEA-6232) describes new GE high-speed mechanical-drive turbines for centrifugal compressors and blowers. Construction and design features are covered. Cross sections, schematic drawings, cutaways and typical installation photos point out design features. (Write: *General Electric Company*, Dept. RLC, Schenectady 5, N. Y.)

12. SWITCHMOBILE. 24-page booklet in color describes and illustrates the features and construction of rubber-tired diesel-powered SwitchMobile for freight car switching. Also describes the Switch-Tractor, a combination switcher-tractor for car moving, maintenance of way and other work. (Write: *Le Tourneau-Westinghouse*, Dept. RLC-085, Peoria, Ill.)

13. WIRE ROPE SLINGS. 4-page bulletin (5308R) lists safe loads for slings of twenty sizes wire rope when used at various angles of application. Covers slings from 1/2 ton safe load to 48.7 tons. (Write: *Macwhhyte Company*, Dept. RLC, Kenosha, Wisconsin.)

14. MASKING TAPE. Brochure describes three lines of masking tape; two offering flexibility. Stresses primary considerations in designing tapes for efficient masking such as stain resistance, heat resistance, thinness, holding strength, etc. (Write: *Permacel Tape Corporation*, Dept. T2 (RLC), New Brunswick, N. J.)

15. CHAIN. 62-page, 2-color catalog (form #ADV-701) describes and illustrates over 25 different types of welded chain assemblies, plus a complete line of accessories. (Write: *Advertising Division, Republic Steel Corp.*, Dept. RLC, 3100 East 45th Street, Cleveland 27, O.)

16. SHELVING. Catalog gives tips on how to plan installations and order shelving in more than 1000 combinations. Includes drawings of basic units and accessories, suggested floor plans, a shelf-capacity chart and photos of completed units. (Write: *Hallowell Division, Standard Pressed Steel Co.*, Dept. RLC, Box 862, Jenkintown, Pa.)

17. ELECTRIC TOOLS. 44-page, 3-hole punched catalog describes the "Silver Line" and "Speed Tool" electric tools. Includes photographs and illustrations showing tools in use with specifications and information on Thor tools introduced in last six months. (Write: *Thor Power Tool Company*, Dept. RLC, Aurora, Ill.)

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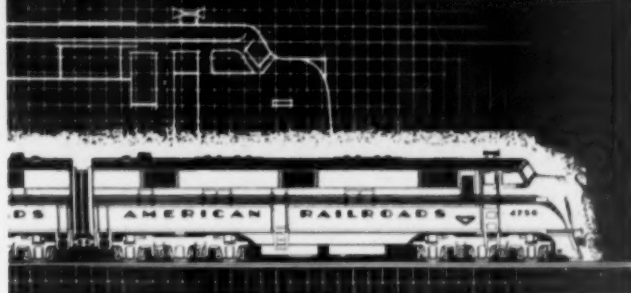
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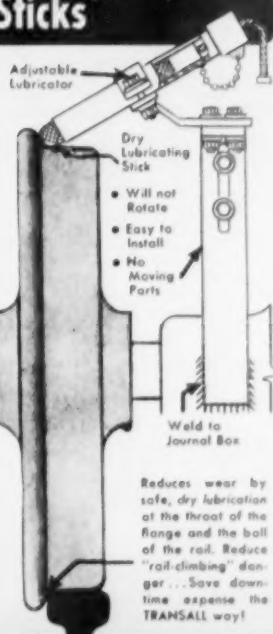
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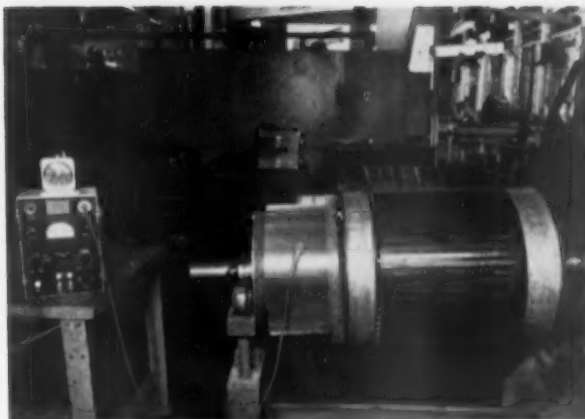


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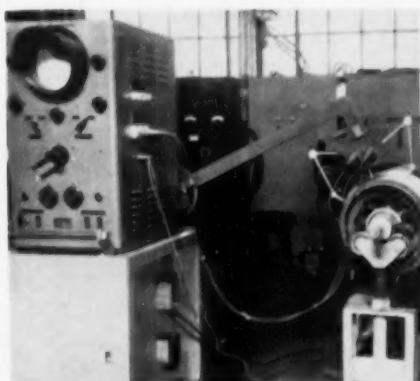
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These tests insure the consistent high quality of National traction motor rewinding...



D. C. GROUND TEST

Excess leakage on the D. C. ground test indicates questionable ground insulation, inadequate cleaning, an insufficient baking cycle or an improperly conditioned winding.



SURGE COMPARISON TEST

This test simultaneously stresses the ground and turn insulation in a manner similar to that encountered when a flashover occurs in service. Weak turn insulation is immediately revealed by the application of the controlled surge voltage.

A. C. GROUND TEST

In accordance with accepted practice, all armature windings are given a standard IEEE one-minute A. C. ground test.



DUCTER TEST

A low resistance ohmmeter capable of measuring resistance of .000001 of an ohm is used to locate possible high resistance connections by measuring the resistance between adjacent bars.

BAR-TO-BAR TEST

Shorted bars, whether caused by a short-circuited turn or by the presence of copper dust between adjacent bars, are quickly located with the electronic armature bar-to-bar tester.



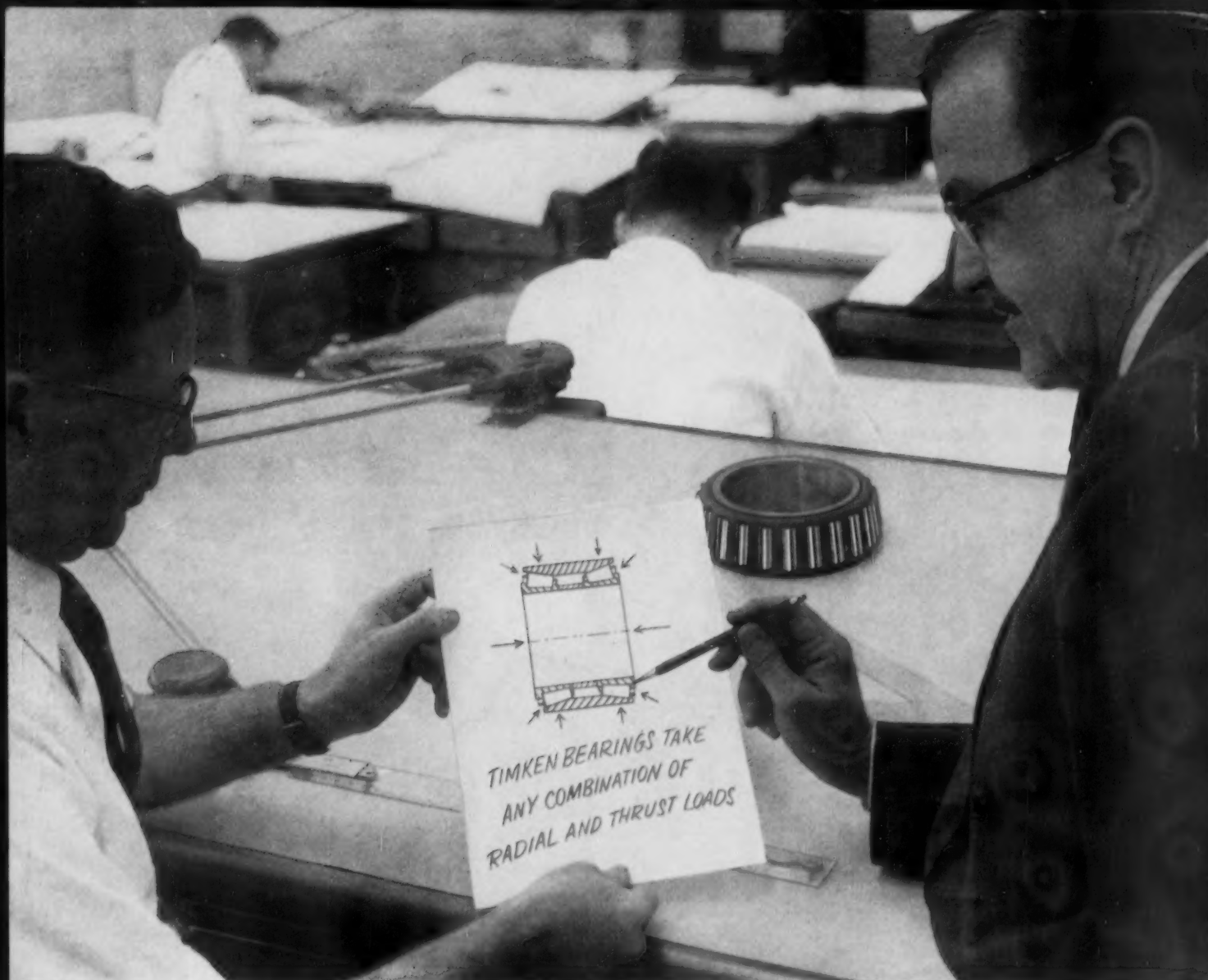
Complete and careful testing is only one of the reasons why National should be your first source for traction motor rewinding. For the complete story, call your nearby National field engineer. If you don't know him, just drop us a line.

NATIONAL ELECTRIC COIL COMPANY

COLUMBUS 16, OHIO, U. S. A.



ELECTRICAL ENGINEERS: MAKERS OF ELECTRICAL COILS AND INSULATION—
REDESIGNING AND REPAIRING OF ROTATING ELECTRICAL MACHINES



The taper makes Timken® the only journal bearing that delivers what you expect when you buy a roller bearing

THERE are two major reasons why you put car journals on roller bearings: to end the hot box problem, and to cut operating and maintenance costs to a minimum. The only bearing you can count on to do both is the Timken® tapered roller bearing. It's the taper. Here's why:

1) **NO LATERAL MOVEMENT WITHIN THE BEARING.** Because of the taper, there's no lateral movement to pump lubricant through the seal and out of the journal box. Costly lubricant is saved, can't leak onto the tracks to cause troublesome wheel slip on diesel locomotives. And no lateral movement means no scuffing of rollers and races to shorten bearing life.

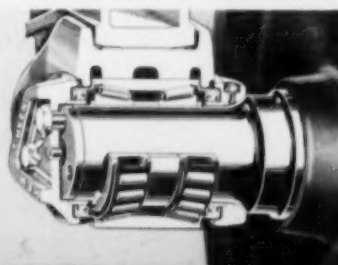
2) **POSITIVE ROLLER ALIGNMENT.** The taper in Timken bearings holds the ends of rollers snug against the cone rib, where wide area contact

keeps them properly aligned. Rollers can't skew to upset full line contact, shorten bearing life.

Unlike costly "crutch" devices that merely attempt to improve friction bearing performance, Timken bearings remove the very cause of hot boxes—the friction bearing itself. And they deliver maximum operating and maintenance savings, too. Timken bearings cut terminal bearing inspection time 90%, reduce lubricant cost as much as 95%. The new Timken heavy-duty type "AP" (All-Purpose) journal bearing assembly will go three years without adding lubricant.

So be sure you get what you pay for when you switch to roller bearings to end the hot box problem, and cut operating and maintenance costs to the bone. Get Timken tapered roller bearings. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

NOT JUST A BALL ○ NOT JUST A ROLLER □ THE TIMKEN TAPERED ROLLER
BEARING TAKES RADIAL AND THRUST —E— LOADS ON ANY COMBINATION



THE TAPER MAKES
TIMKEN
TRADE MARK REG. U. S. PAT. OFF.
THE BEARING
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